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NOVEMBER, 1911

THE FRUIT MAGAZINE

SCIENTIFIC FARMER AND CANADIAN CITIZEN

PUBLISHED MONTHLY IN THE INTERESTS OF GROWERS, DEALERS AND CONSUMERS

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Strathmore, Alberta, August 11, 1911

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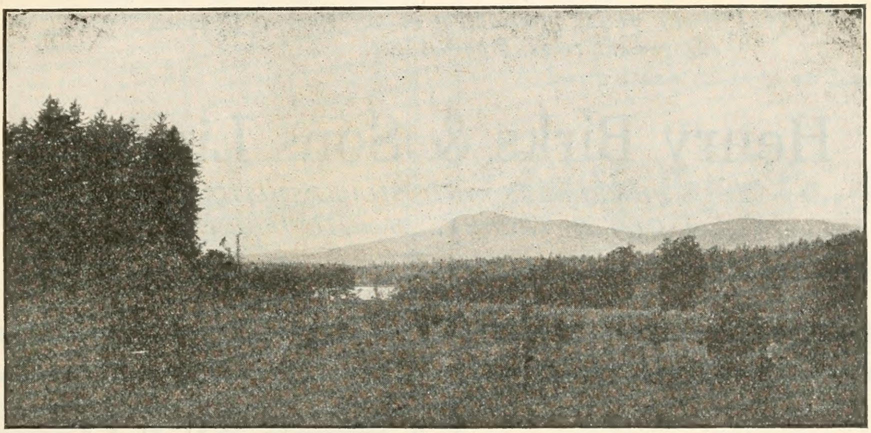

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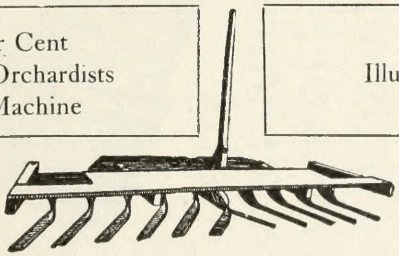

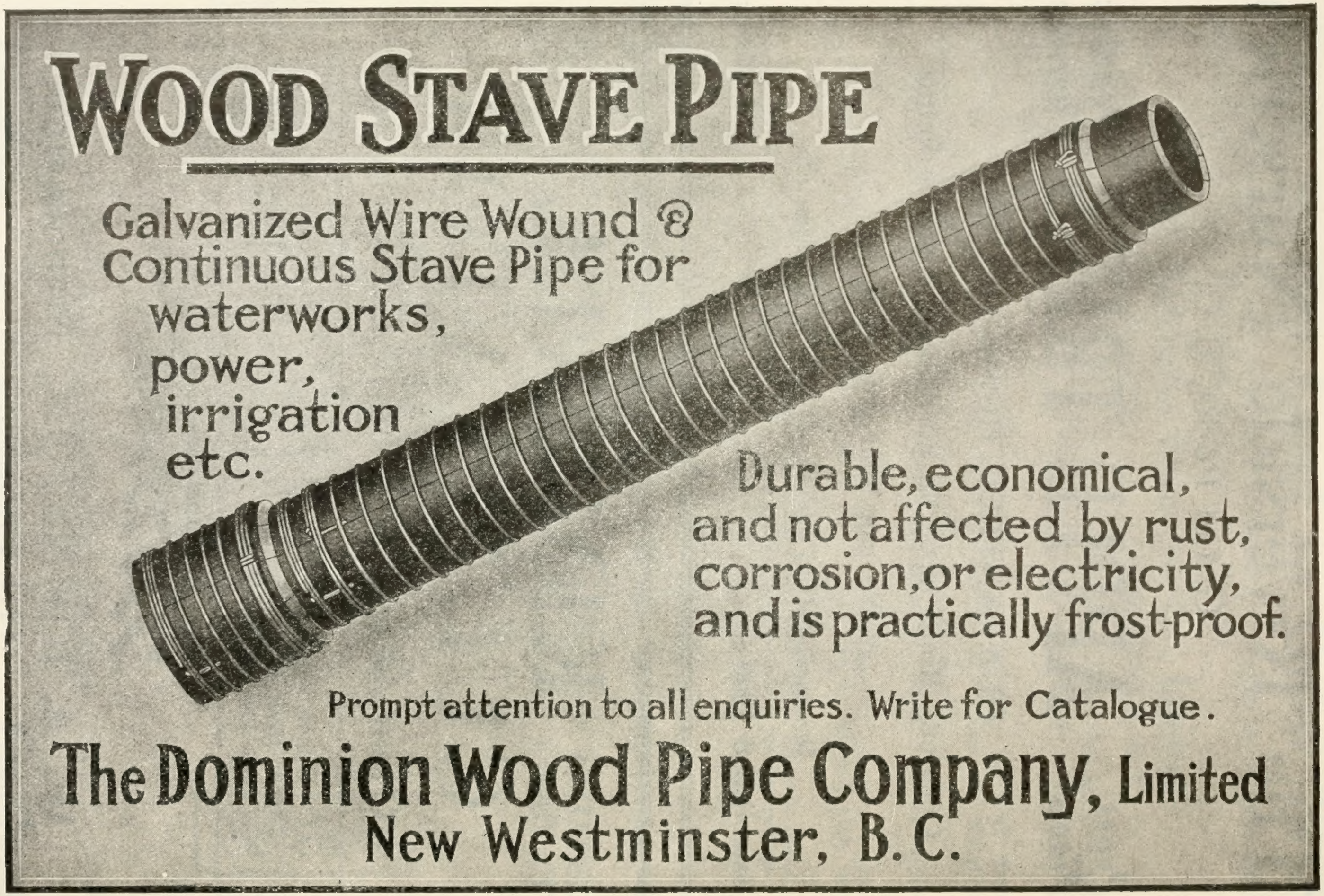

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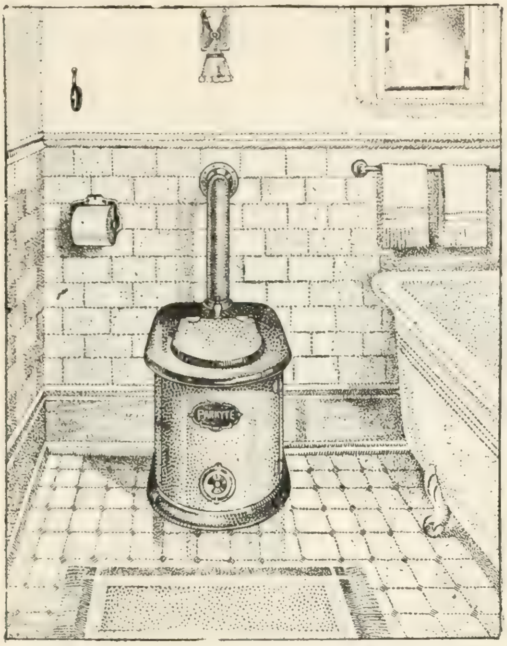

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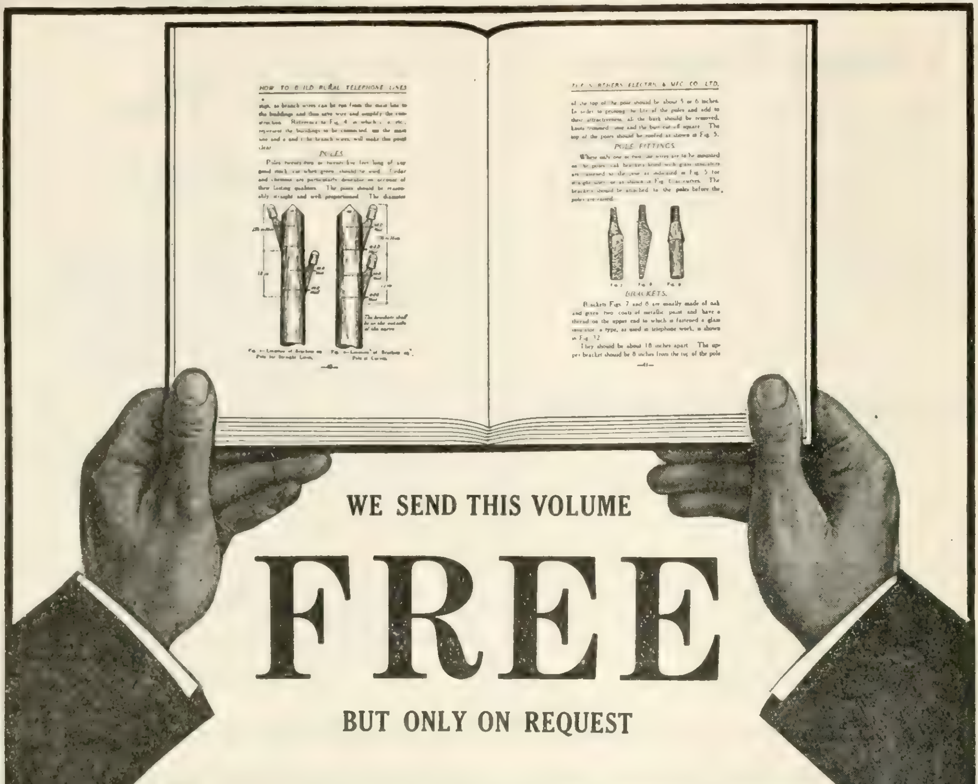

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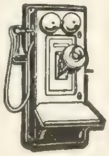

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have an amount of seed sowed on ten acres, and the planting and cultivation, in fact, everything is done under the direction of a man appointed by the Commission. The farmer, in addition, of course, to receiving the crop, also receives a small subsidy in return for setting apart this part of his farm, and I think you will all agree that if it is a success, and if it is adopted, it will be of much benefit to the farmers of that province.

The committee on fisheries has issued a very extensive report, which is now being placed in the hands of the people of Canada. It contains a summary of the laws of each province, and also contains the regulations made by the Dominion with respect to fisheries throughout Canada. It contains a very excellent report on the oyster fisheries of Canada, which are decreasing at an alarming rate. To show you the result of the methods that have been followed, the oyster industry has fallen from 65,000 barrels in 1882 to 38,500 in 1909. To give you an idea of the methods that were followed, I may say that in the early days the oyster fishers actually took the oysters ashore and burned them, simply to get the lime out of the oyster shells, absolutely destroying the oysters themselves. In ice fishing, through holes in the ice, the oysters were dragged out on the ice, the large ones separated from the small ones, and taken off to market, while the small ones were left there to freeze; in summer fishing they were picked over and the large ones picked out and the small ones left on the shore to rot. The farmers who wished to get this oyster mud for a fertilizer would go over the oyster beds, pick up the mud and smother all the young oysters with the mud. The Commission is pointing out these things and urging the necessity for greater stringency in the regulations. The regulations must be made more stringent and must be absolutely enforced. This report also contained an article on the North Atlantic fisheries dispute, which is of great interest to the people of Canada, as it terminates a dispute of many years' standing.

It also contains a report on the white fish of the Great Lakes, which fell from 7½ million pounds in 1890 to 4 millions in 1908. The Commission strongly reports that a much larger number of fry be placed in the lakes. And to give you another instance, which is possibly a little nearer home, the summer catch of white fish in Lake Winnipeg fell from 5¼ millions in 1904 to 2½ millions in 1910, about 40 per cent. of the catch of six years previously. There is only one reason for such a tremendous falling-off, and that is an injudicious method of fishing. This report, also, contains separate reports on each province by the best local authorities.

The mineral committee on minerals has issued a report on the mining laws of the Dominion and each of the various provinces; also a report on the possibility of conservation of our various mineral resources. The possibilities are greatest in the coal, and that, of course, is of interest to the people in the prairie provinces. While you have enormous stores of coal, it is unquestionable that the mining of this coal must be so carried out as to get the maximum production out of it, out of each and every seam, otherwise we may have the same wasteful methods that have obtained in the states, where it has been shown that one and one-half tons of coal has been wasted for one ton that was put on the market. Under the recent improved methods they have reduced that to about a half of one ton. Our mining engineer is at present in British Columbia, and will also visit the mines of Alberta and Saskatchewan with a view to ascertaining what economies are being made in this respect, and what methods are being pursued.

In this connection, also, there is a very important point—the continued conservation of human life. Measures have been taken with reference to protecting the lives and limbs of the employees.

I may say that the report on agriculture, fisheries and minerals has been printed, and I hope at the end of this meeting to get a list of the members who attend the convention and supply each and every one with a copy.

I pass on to the question of water powers. Our report on the water powers is now in the press. It covers in an exhaustive way the powers in Ontario, Quebec and the maritime provinces. When we attempted to deal with the powers in the prairie provinces and British Columbia we found a lamentable dearth of information, and Mr. Arthur V. White, of the Commission, is now attending the convention prior to commencing work in British Columbia, to get information respecting the powers in that province.

I notice in the morning paper that I am credited with saying that the stream measurements in Alberta and British Columbia are unreliable and almost deficient. It only shows that at no time and in no place can a man expect to get reported correctly. What I said to the reporter was that the measurements in British Columbia were almost deficient and inaccurate, such as they were, except in a few special localities where water power plants have been established or are being established. Nothing was further from my intention than to reflect in any way upon the admirable work that is now being done by Mr. Peters, and I hope the government will increase the grant and extend the work.

The Commission is in every way avoiding anything that approaches administration. The idea is to utilize to the best advantage and the greatest extent the work of any and every organization, Dominion, provincial or private, and we only hope that the Department of the Interior will do a great deal more work along the lines upon which they have been working. In connection with this committee on water and water powers we have also, of course, the question of a commission on water, which is a most important one. It is useless conserving our government resources if we do not at the same time conserve the public health and the life of the public. Our public health committee investigated the Ottawa epidemic of typhoid, where we have from 1,000 cases of typhoid about 90 deaths, solely due to the most gross carelessness in allowing polluted water to enter the water mains during fires. When one says 90 deaths, that does not by any means represent the toll of deaths that will follow upon that epidemic. I myself have personal knowledge of five others who have died as a result of that epidemic. It is absolutely preventable. Typhoid is a dirt disease and is absolutely without excuse. It has been almost banished on the continent of Europe and by Great Britain, in the large cities, at any rate, and that it exists to such an extent in the United States and Canada today is a reflection upon the sanitary authorities of this country—of both countries.

This public health committee is also investigating the water supply of Ottawa. Ottawa is a fair example of the average municipalities in Canada. A few miles above the city there is the town of Aylmer, with a population of 4,000. When Aylmer proposed to turn their sewage into the Ottawa River the people of Ottawa were very much excited over the danger to their health. At the same time, Ottawa is turning its sewage into the Ottawa River, utterly regardless of the people on the Ottawa further down the stream. In connection with that I am sure that anyone who has attempted to take a bath in Calgary must have been struck with the fact that the water supply is not all that it might be. (Applause.) There is one idea that obtains amongst the people of this country, and that is that there is such a thing as a pure water supply. Speaking generally, there is no such thing as a pure water supply; that is to say, if the water supply is pure today it may be impure tomorrow, and no municipality is justified in installing a plant for the supplying of water for domestic purposes—water that will be drunk—unless that water is filtered. Speaking in a general way, impure water filtered is better than so-called pure water unfiltered.

This committee has also undertaken an investigation respecting that dreadful disease infantile paralysis, with its very high percentage of deaths, and with its disastrous after-effects in case the patient recovers. Last year in October we had a public health conference, to which we invited representatives and medical health officers of each province of the Dominion, and a number of valuable resolutions were passed, and amongst them one providing for the establishment of a laboratory for the manufacture of antitoxin. It was shown that antitoxines that should have had a percentage of 500 had a percentage of 10, 15 and 20, so that when the doctor administers an antitoxin he has no guarantee that it will have the desired result. Other valuable work was done along the lines of urging the establishment of mountain sanitariums for tuberculosis, the dreadful white plague of this country that has taken so many valuable lives and will take so many more, which, like smallpox, can be absolutely banished. There is really no more reason for the existence of that in the community than there is for smallpox. It was proposed that certain areas be set aside where sanitariums could be established, and these cases treated somewhat analogous to what we find in Saranac Lake, New York, and St. Agathe, Quebec, and other places. Anyone who, like myself, has had a chance to investigate the work that is being done in these places cannot but we struck with the enormous percentage, relatively, of recoveries in these places as compared with the number that recover in the home.

The committee on forests conducted an extensive investigation respecting the fires that we had in the prairie provinces, Ontario and British Columbia last year. In doing this, of course, we enlisted as far as possible the assistance of the Dominion authorities and of the various provincial governments.

One of the most remarkable things that was shown by the report was the fact that in British Columbia 33 per cent. of the known cases of fires were started by railroad locomotives, and the number known to be started by locomotives was 25 per cent. of the total, showing that in all probability railroad locomotives can be blamed for 30 per cent. of the fires that occurred in British Columbia in 1910. The convention made recommendation to the government recommending that the Railway Act be amended to provide for a fine of $1,000 for each and every fire started by railway locomotives, unless it could be shown that the company had the best fire screens and was carrying out an efficient patrol system. The Railway Act was amended, not to provide for the fine of $1,000, but to order the company to install the best fire fighting appliances of all kinds. I need not refer to the second part of the eastern slope of the Rocky Mountains as a forest reserve—that, to my mind, is one of the greatest advances that has been made, so far as protecting the forests is concerned, since the system of forest protection was initiated, and I only regret that the British Columbia government has not set aside larger areas in this province. I cannot conceive of any greater advance than to have the western slope of the Rocky Mountains set aside as a forest reserve. West of the Rocky Mountains we have a great valley, kept by the Kootenay, Columbia, Fraser and other rivers, extending as far north as we are, which should form a natural barrier.

Now, I think that covers the work of the Commission in a very brief and general way, and, as I said before, Mr. Arthur White is here and I would suggest that he make a few remarks respecting the work on water powers in Canada, more particularly with reference to British Columbia and the prairie provinces.

SNOWBALL PUNS

The American journals have given up for a time "Snowball" poetry, and have turned their attention to making puns. Here is the result of some of their efforts:

"We don't care a straw what Shakespeare said—a rose by any other name would not smell as wheat."—*Arkansaw Traveller*

"We have made an oat of the above."—*Burlington Hawkeye.*

"Such puns amaize us. They arouse our righteous corn, and they turn the public taste a rye."—*Norristown Herald.*

"It is true they are barley tolerable, but readers should look out for our new 'cereal' on September 28."—*Pearson's Weekly.*

Water Powers of Canada

By MR. ARTHUR V. WHITE

Before the Western Canada Irrigation Convention at Calgary, Alta., August 9, 10, 11, 1911

MR. Chairman and Gentlemen,—As the secretary has just said, he was unexpectedly asked to make some remarks; and I, also, was quite surprised when I found my name mentioned in this programme. However, I will be pleased to endeavor to set before you, in brief form, some of the work being undertaken by the Commission of Conservation in connection with the water powers of Canada.

As the secretary has mentioned, a report is in process of publication entitled "The Water Powers of Canada." This report, on account of the difficulty experienced in quickly securing water power data in the West, deals chiefly with the portion of Canada lying east of the Manitoba boundary. The introductory pages of this report will set forth, suggestively, important uses to which waters may be applied, other than the development of power. If one examines the interests which are primarily dependent upon the use of waters in the different parts of Canada, he is compelled to recognize the fact that the chief interests of one community are not those of another.

In the province of New Brunswick, for example, the chief interests using the waters are probably timber-driving; on the Great Lakes, navigation; and this convention bears testimony to the importance of water being used in the West for irrigation purposes. When the extensive use of water has become well established in any particular locality it has usually been found that certain interests have already secured control of a large portion of the waters, to the shutting-out of others who would have been glad to have shared in the use of the water had they had opportunity to secure rights at an early period. A condition of affairs somewhat corresponding to what I have indicated has been mentioned at this meeting as existing in respect to water rights for irrigation purposes in the West. In this connection a few remarks may here be in order. These remarks may also be some encouragement to those who are seeking to have these abuses remedied. When questions of water rights have been dealt with in other provinces, the action taken shows that the conditions were far from hopeless. For illustration, in the province of New Brunswick certain log-driving interests had secured control of waters, notably on the St. John River, and other companies were allowed to have their logs stranded in the upper contributary streams or held up at disadvantageous places along the river, while the company who had the controlling of dams released the waters and got their logs well away to the mill. In this instance it became necessary for those who felt that they were unjustly bearing a burden to agitate, in one form or another, to bring these matters to the attention of the proper authorities. After some years of agitation and effort a commission was appointed by the federal governments of Canada and the United States to deal with this one particular issue. The Commission was formed along somewhat similar lines to the Commission known as "The International Waterways Commission," which deals with matters on the Great Lakes. Again, in the province of Ontario large interests were getting very considerable control of the water powers, especially at Niagara Falls. Those who foresaw that the public would suffer from such conduct were forced to agitate to bring these conditions to the attention of one authoritative body after another, in the hope that something could be done to relieve the circumstances. The efforts made to remedy the condition of affairs at Niagara Falls were those which almost directly resulted in the formation of the International Waterways Commission, empowered to deal with the waters along the international boundary.

With regard to the water powers in the province of Ontario, public-spirited men began to see the burden that in the future would fall upon the whole community if the forces which were operating to get control of the water powers were allowed to prevail. As a result of this agitation, the Hydro-Electric Power Commission was formed. This Commission has wide powers conferred upon it by the Ontario government, and has jurisdiction, not only over the water powers, but also in a large measure over the rates charged by those who develop the powers.

The reason that I am mentioning these affairs at Niagara and upon the St. John River is to indicate that conditions had been created which looked as if large portions of the community were going to suffer, just, as has been pointed out in this convention, as in certain districts prior interests have usurped waters which could be distributed in beneficial application to many other people. It has been queried, How can such a condition of affairs be remedied? I have, therefore, mentioned these other instances in order to show that where somewhat corresponding conditions did exist, these conditions were, in large part, remedied. In some cases, however, not before what might have seemed very drastic legislation was enacted to clear away the difficulties.

In considering agitation of this character, I have been struck with the fact that the burden has primarily, and for a long time often, been carried by a few public-spirited men. Conventions may have been called and committees appointed, but the work, the real work that was done to get the thing going was done sometimes by one or two men. It often took a year, two years or more, in order to get sufficient data together so that when the pioneer workers, so to speak, made statements, they had the facts back of them to carry conviction to those to whom the general condition of affairs was being presented. In the case of the Hydro-Electric Commission of Ontario, for two or three years a few men nursed things along, making inventories and securing other data. Assistants, for example, were engaged to make a personal canvass of every manufacturer in certain districts, in order to ascertain his power needs. When these data were gathered they formed a basis upon which something more could be done than, as it were, just discussing the difficulties which existed.

I could not help but feel yesterday, in listening to the statements that were made with regard to difficulties which existed upon certain waterways in the West, where water rights had already been taken up by some, to the shutting-out of others, that one or two particular instances would have been of great worth. If, for example, a map of a certain district, showing the area of its contributary waters, the number of landholders on the particular stretch of territory which might be irrigated, the number of persons who actually held the water rights and the amount held by each, the number of acres which represented the amount of water that was held, and a number of acres that were excluded from using the waters, then a presentation of facts of that character—if the facts were carefully and fairly obtained—would give a basis upon which discussion could have centred. It could then be said, "Here is an instance representing conditions which exist." Now, in cases such as I have mentioned upon the St. John River, and in the case of the Hydro-Electric Commission of Ontario, data of the character indicated were first carefully gathered. Then when such data were presented to the parties who could put the legislative machinery in operation, it was recognized that the people who were pushing things intended business. I have mentioned that this preliminary work was often done by a few individuals, who recognized the needs, gathered the information and then handed it over to those who were able to deal, in a representative capacity, with bodies empowered to grant legislative authority to deal with the issues in hand. May it not be that a course resembling that just suggested could profitably be adopted in connection with effort made to remedy the abuses which exist respecting waters usable for irrigation?

Now, it is proposed in the province of British Columbia, and the prairie provinces, to gather some information respecting water powers. Such data may possibly suggest the need for further legislation in order better to conserve these resources.

It is not, now, the intention of the Commission to gather water power data of a specially precise character. Nor is it the intention now to adopt detailed methods, such as are employed by the Irrigation Branch of the Department of the Interior. The Commission desires, as quickly as possible, to make a list, or inventory, of all the water power sites, either developed or undeveloped, of which knowledge may be obtained without undue expense. Such a list will give some idea as to what are the water power assets of any community.

It has been the custom, in gathering similar information elsewhere, to make a tabular list of the water powers. In such a list appear the name of the river or lake, as the case may be, where the water power is located; the local names of the respective falls or rapids; the computed areas of the respective watersheds, as taken from the best available maps; the head, or height, of the fall or rapids (in feet) obtainable at each particular site; and an estimate of the available amounts of horse-power. Such estimates are based upon the best obtainable measurements of the flow of water on each respective stream. Such an estimate, where data are meagre, is necessarily of the nature of a guess. However, in the absence of data of a precise character—and which it takes years to obtain—estimates, such as have been referred to, are welcome to many persons who desire to have some idea of the water power possibilities of various power sites.

The nature of such data may be apprehended from the following:

Name of river—Smith River.

Name of falls—Beaver Falls.

Area of the watershed—370 square miles.

Head obtainable—320 feet.

Estimated low-water flow—110 cubic feet per second.

Estimated low-water 24-hour horsepower, theoretical—4,000.

Remarks—Direct fall of 100 feet, and fall of 220 feet in about 3,000 feet of rapids below the falls. High, rocky banks, two miles above Smith P. O.

Such data will be accompanied by an index map which will show the locations of the various power sites.

I will be much obliged to any person who has knowledge of water powers if he will communicate with me, care of the Hotel Vancouver, Vancouver, within the next month or two. I would be very glad to avail myself of the data; and in moving about here and there through the province I will, if possible, be glad to call on any name given me, and secure such assistance as might be rendered.

I thank you very much for your attention.

CO-OPERATION

ONE of the sound economic principles that seems destined to command a much larger place in the future development of this country than it has in the past is the principle of co-operation. Not only does cooperation commend itself as an abstract principle, but it also works out well in the concrete. We shall pass by, for the moment, some notable illustrations of success in co-operative effort which our own country could furnish and note that in the small country of Denmark alone there are more than one thousand cooperative dairy concerns manufacturing more than thirty-five million dollars' worth of butter annually. Co-operation in Denmark also takes many other forms, and even banks are organized and run by associations of farmers. Even in the United States, which country, like Canada, has been very largely marked by the strict individualism of its people, we find that there are nearly four million farmers associated with cooperative organizations of one sort and another. These are only random facts, but they indicate the drift of things generally.

Lady Adanac's Fireside Talks

ONE hears on all sides that the Bible is no longer read nowadays. What a loss, if true! Small wonder if the common currency of language is debased; conversation a lost art; polite letter-writing a thing of the past; and bad taste in literature the rule and not the exception. For the Bible, more than Dan Chaucer, may be called a "well of English undefiled." The style of the Old Testament narration elevates the taste by its simplicity and touches the heart by its humanity.

The heading of our new department was suggested by the story of Jacob's meeting with Esau after a lapse of many years. "The mother with the children," "The women and the children"—how they filled the thoughts of the chivalrous Jacob, and how tenderly he placed them in a position of safety before his warlike brother drew near—securest of all, the beloved Rachel for whom he served twice seven years—"and they seemed unto him but a few days for the love he had unto her."

It is not such a far cry as it might seem from those early days to our own. In the family life of the Israelites women held an important and honorable place, as they always have done with any people whose national life is healthy and strong. Human nature has been the same in all ages, and those were not degenerate days.

I do not think that in all history you could find a man or a nation who had gone out to battle, or set forth on a great undertaking, or achieved any notable thing, that some woman, or women, had not inspired the action, helped in the fight or shared in the strain of the endeavor. So it is now, and so it should always be. The "white man's burden" must be shared by the "white woman" if it is not to be dropped by the way and lost sight of, and the woman who wants to shirk her share of family or national responsibility either does it in ignorance or is a poor specimen of her sex.

This month I want to say a few words about the woman's place in the family—and by "the woman" I don't mean "woman" in the abstract, but just you and me, dear readers—just the young woman and the old woman, the ordinary, everyday woman who reads this magazine, because it comes to the house and her husband, or father, or brother is interested in it.

That is one point for us to note. We must be interested in everything that concerns the common life of the home, and nothing touches it more closely than the breadwinner's business or profession. Understand your husband's business well enough to listen intelligently when he talks about it, and to give advice when it is asked, though if you are wise the latter will generally be given along the lines that he himself has already suggested. An interfering wife, like a husband with too decided views on the subject of household management, is a nuisance.

It is a trite saying that the man is the head of the family, and the woman its heart. Sometimes the roles are reversed, but that does not matter; it is a poor family that is not supplied with both organs. The head controls and orders, while the heart distributes warmth and nourishment to every member. Interpret this in terms of love and energy and you have the woman's part. She who looks after the material wants of her family only is nothing but a stomach—useful organ, but uninspiring; while the selfish, mean-spirited, lazy or bad-tempered woman starves those depending on her, in soul if not in body, and is the cause of most of the sad diseases that afflict the family life and cause its death from natural decay, or bring it to a violent conclusion in the divorce court.

But to be practical and literal. How are we women to supply the husband and children whom we dearly love—the father, the mother, the relations of all degrees that make up the family circle—with that heart's blood of life that will keep them healthy and happy? The answer is so easy, yet so hard—*by having it ourselves.*

Great as is woman's power, she possesses no magic wand to wave over her dear ones to secure for them all the good she knows they need. Moreover, words are barren things; only *being* inspires *doing.* You can't teach industry by lying abed, nor inculcate gentleness with sharp words; you can't discipline children if you don't begin on yourself; you can only win love by loving.

This may be a hard saying, but is it not a satisfaction to know that we hold the key to the situation in our own hands? This power is ours, and no one can take it from us—the power to realize in our own selves, as far as in us lies, our own ideal of the woman in the home. Imperfect as that realization may be, it will be a source of inspiration and of help and joy to others, as is always the example of any woman of whom it can be said, "She hath done what she could."

But, of course, we poor women are only human, and it would be unreasonable, and very disappointing, to expect any one of us to exhibit all the excellencies of the sex. The hasty-tempered woman *may* give the soft answer that turneth away wrath, but better not to count on it. Yet she will spend a weary afternoon cleaning and pressing her husband's suit to atone for the cross words spoken. A careless mother lingers over her book and lets her little one play too long in the chilling wind. But watch her nurse the croupy child through the long night hours with a fury of devotion that snatches him out of the jaws of death.

After all, "'Tis love that makes the world go round"; love that makes good our errors, turns our weakness into strength, and not only covers the multitude of sins, but obliterates them so completely that, in the end, it is as if they had never been.

BIDDY'S MORNING CALL

Biddy bounced in, shaking the wet from her curly hair.

"Jupiter Pluvius is on the job again!" she exclaimed. "Here have I been praying for fine weather, because I have no new winter suit and won't have for a month, and instead of complying with my reasonable request, there comes this deluge! I feel like the Scotch elder, you know, Lady Adanac—the one that prayed for fine weather in the kirk, and the rain descended in such floods he had to shout to make himself heard. 'Laird, Laird, this is fair redeeclus!' he said; and so do I."

I smiled indulgently and waited for the rest of the outburst.

"Why should they have all the good things in California, I'd like to know?" demanded Biddy; "more sunshine than they know what to do with, and now woman suffrage!"

"Will they know what to do with that?" I asked.

Biddy looked at me slyly, then remarked with an amiable smile, "I didn't come to talk politics or woman suffrage, or anything lofty this morning, Lady Adanac; only to ask your advice about making over my old suit."

"Why make it over?" said I. "A young woman earning fifty dollars a month and living at home—surely you can afford a new one?"

"It's this blessed Christmas!" stormed Biddy, once more screwing up her round face in indignation. "What's the use of it, anyway? Giving a lot of presents nobody wants, and getting a lot you don't want yourself! I'm going on strike. I'm not going to buy two dollars' worth of wool to knit a shawl for grandmother when I know she has dozens of them put away in her drawer; and I'm not going to buy silk handkerchiefs for Uncle George; nor a brass tray for Aunt Eleanor; nor gloves, nor jabots, nor writing-cases for anybody—so there!"

"Very sensible, I'm sure, Biddy," I said soothingly. "Take the money and buy yourself one of those suits we were looking at yesterday."

"What! One of those things with a skirt up to my knees?"

"So suitable for the wet weather, Biddy."

"Is it?" she laughed, dimples once more chasing away the frowns. "So nice for stepping over mud puddles, too! Just wide enough to land you in the middle every time! I refuse to spend a half, or even a quarter of my hundred dollars on such a garment."

"A hundred dollars, Biddy? What wealth! Why not take that trip to California and visit Mabel, and get away from this atrocious Vancouver winter?"

"Vancouver's all right," my little friend interrupted; "besides, there's Christmas."

"But you said you weren't going to give any presents?"

"I'm going to give heaps and heaps!" cried Biddy. "A doll—a *nice* doll that looks like a real baby—to every little girl in my Sunday-school class, and a knife to every boy I know, and a stove for old Miss Mary."

"Why old Miss Mary?" I gasped.

"Because she's a saint and needs looking after, or else she'll get the grippe and die. I don't want her to die."

Miss Mary is a district visitor—a charitable old soul, as poor as poverty. "Somebody else ought to buy her a stove," I said severely.

"But nobody else will—worse luck!" sighed Biddy.

"And, my dear Lady Adanac," she added with one of her adorable smiles, "what do *you* want for a Christmas present? Now, don't say a set of furs, for I'm afraid I couldn't afford it!"

"Biddy, you are so inconsistent," I protested.

"I know it," replied the young woman brazenly; "but you know you wouldn't like me half so well if I wasn't."

And then we talked about making over the old suit.

THE BULL ON THE VERANDAH

"Peggy, come here!" shrieked Fred, "and Baby too, if she likes; Grandma's going to——" but there he stopped, not wanting to tell, but only to make them curious.

It was after supper, so the children were not far away, for the winter twilight had closed in a couple of hours before. The wood fire was blazing, and everything was cosy in the room where Grandma sat knitting in her rocking chair, while Fred danced around her and called to the others.

Trot came first, from the kitchen, where the kittens were playing on the floor and Mary was having her supper, sharing her piece of cake with the little girl, as she was not fond of sweet things, she said.

Peggy had only to put away her slate and then she came, too.

"What is Grandma going to do?" she asked.

"Guess!" said her brother, still hopping from one foot to the other.

"I can't! Tell me, Grandma, please?"

"Oh, I'll tell you if you can't guess," interposed Fred hastily; "she's going to tell us a true story every night about every single uncle and aunt and father and mother we've got."

"Goodness, how lovely!" cried Peggy. "That'll be stories enough for a year, I guess; we've got such a lot of relations."

Five-year-old Trot, who had not said a word yet, sidled up to Grandma and patted her cheek softly. "Begin *now*, Grandma," she whispered.

"Who shall I tell about first?" the old lady asked.

"Begin with your own self, because you're the oldest," commanded Fred.

"Were you ever in a wreck or a railway accident?"

"Never in all my life," smiled Grandma.

"Then tell us the bravest thing you ever did," coaxed Peggy; "you must have had some adventures."

"But I'm not a brave person; I never was," Grandma said with a shake of her head. "I was brought up in the city and I never lived in the country till I was grown up, and that was far, far away from my old Canadian home."

"In that hot country?" Trot asked.

"Yes, in that hot country I have sometimes told you about. And I remember years ago over there," the old lady continued in a musing tone, "I once did do something that I certainly could never have done if it hadn't been—but perhaps I had better begin at the beginning.

"It was when your dear mother was a baby, children, and it was in the middle of January, when the weather was hotter than anything you children have ever felt in July or August. The peaches were ripe and I was in the kitchen making jam.

"Baby—your mother, darlings—woke early from her morning nap, and because it was so hot, I put her on a rug in the shady, wide verandah that ran between the kitchen and the main house. She was only six months old, not yet creeping, so I knew that she could not get into mischief and would be good for a while, anyway, while I finished my jam-making. There was a strong hot wind blowing, as it often does in summer there, so I shut the door from the kitchen to the verandah, because the wind blew things about and annoyed me while I was pouring the jam into jars. Baby was good and quiet, and, anyway, I could hear her if she cried.

"When I had a trayful of jars ready I opened the door again to carry them across to the pantry, which was across from the kitchen on the other side of the verandah; but as I threw it open what a sight met my eyes! If my heart didn't jump into my mouth, children, it came up high enough to nearly choke me, and I felt giddy and sick for a moment.

"There, walking along the verandah, within a few yards of my precious baby, was our Jersey bull! He was a beautiful fellow with a dark coat that shone like satin and a handsome head which he held high now, as he stepped proudly along."

"Was he a fierce one?" Fred inquired breathlessly, as Grandma paused.

"Not particularly," she said, "but he had his moods, as such beasts always have, and I knew he must be excited now or he would not have broken loose."

"What did you do?" they asked in one breath, for Grandma seemed rather slow now that the exciting part of the story was reached, and she had stopped to count stitches.

"Do?" she said, laying down her knitting. "Why, in one second I had placed my tray of jam on the table by the door —I have often wondered why I didn't drop it—and the next instant I sprang in front of the bull and had clutched the ring that was in his nose.

"He tossed his head and roared with rage and pawed the cement verandah floor; but I only held on all the tighter. Strange to say, I didn't feel in the least frightened once I had hold of the ring —only so pleased that I had him safe and quite sure he could not get away from me, and neither could he, as long as I held on.

"There was a maid in the kitchen, and of course she heard the noise and came out. When she saw me holding the bull by the nose she began to scream for help; but there was no one in the house just then, and the barn was a little way off. No one came, so apparently her screams were not heard.

"The noise she made annoyed me, and I told her to be quiet and take care of the baby while I led Joe—that was the bull's name—away.

"'Don't do it, Mam!' she begged; 'let him go and do you get into the house. I'll take the baby, bless it'; and she picked your mother up and ran into the house with her, and then waited behind the screen-door to see what I would do.

"Joe was quiet now, and I was determined to take him down to the barn. 'Come with me, Sarah,' I said, 'and call the men.'

"'Oh, Mam, I daren't. He might get away and gore me,' she said, but at last I persuaded her to come with me, after she had put the baby into her cradle.

"I pulled Joe along till I got him off the verandah, which was only a foot above the ground, and then we formed a procession down the yard, Sarah in advance, calling to the men at the top of her voice. The bull muttered and rumbled angrily, and tried to break away once or twice, but it seemed as if nothing could loosen my hold of the ring. I doubt if I could have let go if I had wanted to then. It was two or three hundred yards to the barn, but Sarah ran on ahead and found the men at last eating their dinner on the shady side of the haystack. The latter and the strong wind together had, no doubt, prevented them from hearing us.

"They were not long in coming to my assistance once they understood what had happened, and they soon had Joe safe behind the bars of the stockyard.

"It appeared that he had been allowed loose in a paddock not far from the house for the previous day or two, and having tasted freedom, he desired more. So he broke his fence down and was making a tour of inspection of the place when I saw him. I've often wondered what brought him to the verandah!"

"Where were all the others? Why did nobody see him?" queried Fred.

"Grandfather was away in the township; the other children were having a little picnic down at the creek; the men were eating their dinner, as I told you, out of sight of Joe's paddock.

"Well, as soon as I saw the men lead away Joe, my courage all vanished, the strength went out of my body, and my knees began to shake. Sarah had to help me back to the house; but there, children, if I tell you just how I felt when it was all over, you will think I hadn't changed much since the day I sat in the hen-house and trembled for fear of a cross old hen, as I did on my first visit to the country, which I have told you about."

"I'll never think you were a coward now, Grandma," said Fred with genuine admiration; "not a side of you!"

"If it had been me I don't believe I'd have thought of the ring," put in Peggy; "I'd most likely have thrown all the jam in his face, and then he'd have been madder than ever."

"S'posin'," began Trot, and then hesitated, her sweet little face upturned to Grandma's with a troubled expression on.

"Supposing what, pet?" asked Grandma.

"S'posin' you'd missed catching that ring, or hadn't opened the door just that second, was mother right in front of that bull when she was only a tiny baby?"

"Right in front, darling. He might have trampled on her; he might have gored her; or he might have left her alone and gone on; no one can tell what might have happened if I hadn't opened the door just then, or if I hadn't managed to catch hold of his ring. But it all came out right, you see, pet—that's the best part of it."

Baby Trot threw her arms around Grandma's neck. "I think I'd like to give you a kiss, Grandma," she said, "for doing that for my mother!"

FARMERS' INSTITUTES

THE sixteenth annual meeting of the American Association of Farmers' Institute Workers will be held in Columbus, Ohio, November 13, 14 and 15, when the following reports of standing committees will be received:

(a) Institute Organization and Methods.—J. H. Connell, Stillwater, Okla.; W. C. Latta, Lafayette, Ind.; G. A. Putnam, Toronto, Ontario. Discussion.

(b) Institute Lecturers.—B. Walker McKeen, Fryeburg, Me.; D. W. Working, Washington, D. C.; F. S. Cooley, Bozeman, Mont. Discussion.

(c) Co-operation With Other Educational Agencies.—G. C. Creelman, Guelph, Ontario; K. L. Butterfield, Amherst, Mass.; R. A. Pearson, Albany, N. Y. Discussion.

(d) Movable Schools of Agriculture.—L. R. Taft, East Lansing, Mich.; L. A. Merrill, Salt Lake City, Utah; A. L. Martin, Harrisburg, Pa. Discussion.

(e) Boys' and Girls' Institutes.—F. H. Rankin, Urbana, Ill.; Val Keyser, Lincoln, Nebr.; A. D. Wilson, St. Paul, Minn. Discussion.

(f) Women's Institutes. — Miss Martha Van Rensselaer, Ithaca, N. Y.; Miss Laura Rose, Guelph, Ontario; Mrs. F. L. Stevens, Raleigh, N. C. Discussion.

SUBJECTS FOR DISCUSSION

GROUP 1

1. What plan for "following up" institute instruction can be adopted that will secure the introduction of better methods into farm practice? By W. C. Latta, Lafayette, Ind. Discussion by J. Withycombe, Corvallis, Oregon.

2. Should at least one common topic be agreed upon for discussion in every institute in the United States and Canada during the coming year? By G. A. Putnam, Toronto, Canada. Discussion by A. M. Soule, Athens, Ga.

3. What number of lecturers should the state director furnish for each insti-

tute, and how much of the day's programme should these lecturers supply? By P. H. Rolfs, Gainesville, Fla. Discussion by E. P. Ansley, Oklahoma City, Okla.

4. What proportion of the "state" appropriation should be used for local expenses? By A. L. Martin, Harrisburg, Pa. Discussion by E. A. Burnett, Lincoln, Nebr.

5. Is it advisable and feasible for the country institute to hold meetings quarterly or monthly throughout the year? By J. H. Miller, Manhattan, Kans. Discussion by G. C. Creelman, Guelph, Ontario.

GROUP 2

1. What is the most effective method for conducting an agricultural instruction train? By J. E. Hite, Athens, Ga. Discussion by H. M. Cottrell, Chicago, Ill.

2. Should the institute systematically conduct field, orchard, household and kindred demonstrations? If so, how should the work be organized? By H. A. Surface, Harrisburg, Pa. Discussion by C. E. Thorne, Wooster, Ohio.

3. Should the institute, for demonstration purposes, organize and conduct fixed vocational schools of agriculture for men and schools of domestic science for women? If so, how long should each continue, and what should the course include? By G. A. Gigault, Quebec, Canada. Discussion by Wesley Webb, Dover, Del.

GROUP 3

1. How should the central department of institute control in a State be organized to secure the highest development of the work? By W. J. Black, Manitoba, Canada. Discussion by T. C. Wilson, Columbia, Mo.

2. What are the respective duties and proper relations of the State director and local manager in a well organized system of institute work? By W. T. Clarke, Berkeley, Cal. Discussion by A. D. Wilson, St. Paul, Minn.

3. What should be the leading purpose of the annual round-up institute, and what the character of the programme to accomplish that purpose? By H. A. McKeene, Springfield, Ill. Discussion by M. C. Rankin, Frankfort, Ky.

4. What should be the character of the State director's annual report? By O. D. Center, Springfield, Ill. Discussion by George McKerrow, Madison, Wis.

GROUP 4

Condition of the Colored Farmers of the South.—Papers by the following gentlemen are offered in response to invitation of the association extended by a resolution passed at its meeting in 1910, calling for information upon the condition of the colored farmers of the south: George R. Bridgeforth, Tuskegee Institute, Ala; R. P. Brooks, University of Georgia, Athens, Ga.; James B. Dudley, North Carolina Agricultural and Mechanical College, Greensboro, N. C.; C. K. Graham, Hampton Institute, Hampton, Va.; T. S. Inborden, Brick Agricultural, Industrial and Normal School, Enfield, N. C.; Thomas Jesse Jones, Bureau of the Census, Washington, D. C.; F. L. Maxwell, Mound, La.; P. C. Parks, Clark University, Atlanta, Ga.; U. B. Phillips, Tulane University, New Orleans, La.; G. W. Sentell, Bunkie, La.; A. Eugene Thompson, Lincoln Institute, Berea, Ky.

WINTER EGGS

By W. W. Storms

THE laying hen is usually searching for what she needs to make eggs. She takes what she wants in the way of food and lets the rest alone.

If you compel her to take what she doesn't want or take nothing, why, of course, she will take what you provide rather than starve to death, but she won't lay as many eggs.

Therefore, we like the hopper method of feeding. We always provide a self-feeder hung on the wall just high enough so the hens can eat what they want without wasting it on the floor.

A better method is to provide a platform 16 inches or so above the floor, so the fowl can jump up and down for the feed and water they desire, and then go back to the litter to work for the grain that is scattered in it.

In one apartment of the self-feeder is grit; another, charcoal; another, oyster shells; another, equal parts of finely cracked corn, wheat, barley and oats; in another, beef scraps; in still another is placed dry bran.

You might think that the hens will eat too much, but they won't; they will eat only what they want.

When you find a hen that lives off the feeder and gets fat and lazy, she is usually too lazy to work and too lazy to lay eggs, and had better be sent to the butcher.

Scatter the whole grain, such as wheat, barley and corn, in the litter. Feed them whole corn at night, especially on cool nights. They need a cropful to keep up the bodily heat over night.

Give them table scraps and green food at noon. For green food we use cabbages, mangel-wurzels, sugar beets, chopped apples, etc. Onions are also relished, but they are liable to flavor the eggs.

Noon is also a good time to feed green cut bone. Give them a little every day, and only what they will eat up clean.

It is a rich food, a great egg-producer, and a little will go a long way. If you notice a looseness of the bowels after feeding it, cut down the amount.

Keep them always eager and their appetites sharp for fresh meat and cut bone, and you will get all the eggs you can expect.

Once in a while feed a mash in the morning composed of bran, middlings, beef scraps, etc., mixed with a little milk or water. It must not be wet and sloppy, but dry and crumbly.

Feed them only what they will eat up quickly and cleanly. They shouldn't be allowed to trample on any that is left over, or to leave any to become sour and foul.

Fowls should have plenty of fresh water, and never warm it. They like a cool, fresh drink, the same as we do.

Provide a dust-bath, so they may help to rid themselves of lice. Use plenty of liquid louse-killer and keep the whole pen scrupulously clean.

If a variety of food is given there is no need of fear about plenty of eggs. Do not feed whole grain in hoppers. Only the ground food, beef scraps and bran are fed there.

If these simple suggestions are carried out, consistent with your local conditions, the hens will do the rest.

Two dozen eggs every day will be just like finding $1.20 in change in the nest, according to prices for fresh eggs in the local market.

TWO

Two lovers by a moss-grown spring:
They leaned soft cheeks together there,
Mingled the dark and sunny hair,
And heard the wooing thrushes sing.
O budding time!
O love's best prime!

Two wedded from the portal step:
The bells made happy carollings,
The air was soft as fanning wings,
White petals on the pathway slept.
O pure-eyed bride!
O tender pride!

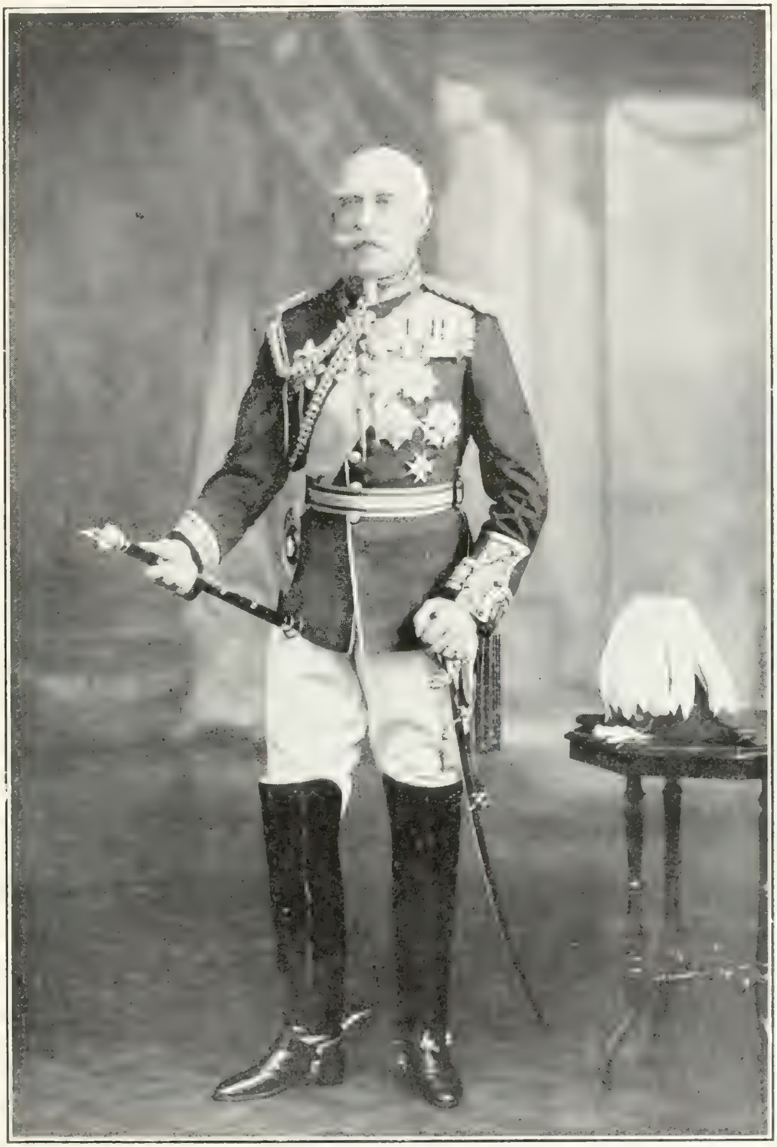
Two faces o'er a cradle bent:
Two hands above the head were locked;
They pressed each other while they rocked,
Those watched a life that love had sent.
O solemn hour!
O hidden power!

Two parents by the evening fire;
The red light fell about their knees
On heads that rose by slow degrees
Like buds upon the lily spire.
O patient life!
O tender strife!

The two sat still together there,
The red light shone about their knees;
But all the heads by slow degrees
Had gone and left that lonely pair.
O voyage fast!
O lonely past!

The red light shone upon the floor
And made the space between them wide;
They drew their chairs up side by side,
Their pale cheeks joined, and said, "Once more!"
O memories!
O past that is!

—*George Eliot*



HIS EXCELLENCY THE DUKE OF CONNAUGHT,
SWORN IN, GOVERNOR-GENERAL OF CANADA, OCTOBER 13, 1911

By Special Permission of W. and D. Downey

Editorial

LADY ADANAC'S FIRESIDE TALKS

A NEW department, devoted chiefly to women and children, begins in this number. We commend it to our readers of the gentler sex and to their boys and girls—our future fruit-growers, scientific farmers and Canadian citizens generally. This magazine in future will contain still more interesting matter for our city readers. In a word, *The Fruit Magazine, Scientific Farmer and Canadian Citizen* will aim to merit a warm welcome in the homes of the intelligent classes everywhere, whether in town or country.

* * *

OUR CHRISTMAS NUMBER

OUR December number will be the best yet issued, and an admirable Christmas gift to send to friends in distant parts. In addition to the usual number of splendid half-tone illustrations, there will be a beautiful three-color frontispiece of unusual interest. A number of valuable articles on farming and fruit-growing will make up the body of the book, and the first instalment of that fascinating narrative, "The Little Apricot Cutter," by Mrs. M. Ella Chaffey, will appear in this number.

Amongst other important subjects dealt with in the editorial columns will be "The national dangers resulting from the abnormal growth of cities at the expense of the rural communities" and "The neglect of agriculture in our public schools."

A special article by the Editor on the subject of "Patriotism" will also be of interest, not only to the average Canadian citizen, but to those of our foreign readers who have the national welfare of their country at heart, and who desire to promote the spirit of goodwill among men.

A NEW SERIAL STORY

WE take pleasure in announcing to our readers a new serial story which will begin in our December number, entitled "The Little Apricot Cutter." The author is Mrs. M. Ella Chaffey, a writer of distinction whose works are better known in Australia than in Canada, for although Canadian born and now resident in Vancouver, Mrs. Chaffey lived for many years in the south.

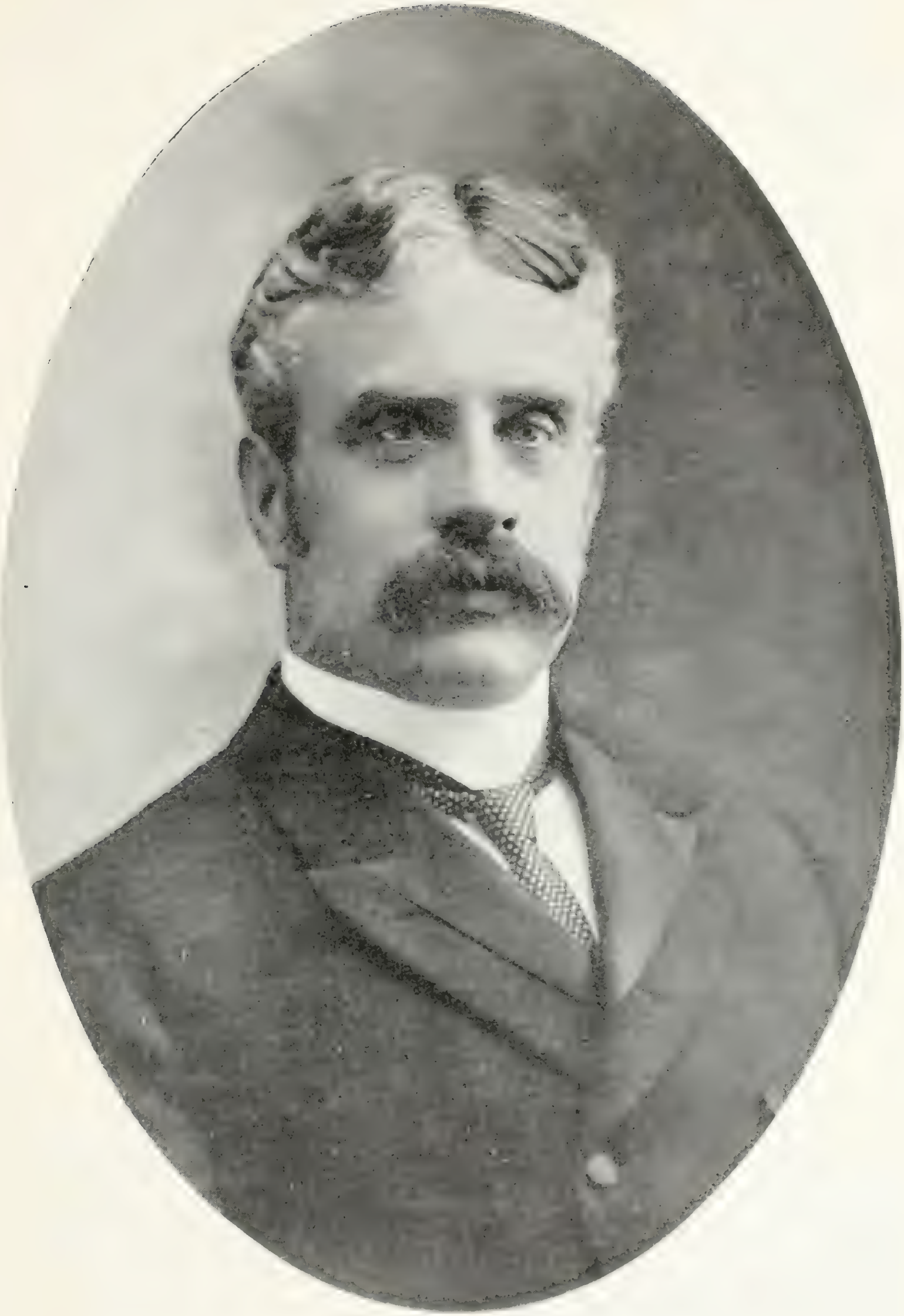
The scene of this novel, the sole serial rights of which we have secured for *The Fruit Magazine, Scientific Farmer and Canadian Citizen,* is laid on the banks of the great Murray River, whose waters irrigate large areas of land, formerly arid land, but now transformed into populous fruit-growing settlements. Here we are introduced to "The Little Apricot Cutter." After one idyllic summer the scene shifts to the Western Australian mines, where the plot thickens, and we can promise our readers enough both of action and romance to hold their interest absorbingly from month to month, and to leave them entirely satisfied in the end. If you are not now one of our regular subscribers, be sure to send in your order in time to get our December (Christmas) number.

This magazine enjoys a large circulation in other parts of the English-speaking world, because of the information which it contains about Canada, and this splendid romance will convey much interesting information about life under the Southern Cross to our numerous readers in the northern hemisphere, particularly those under the Maple Leaf.

* * *

DAIRY AND COLD STORAGE COMMISSIONER'S REPORT

WE are in receipt of the report of the Dairy and Cold Storage Commissioner for the fiscal year ending March 31, 1911, in which we find much of interest on the subjects of dairying, extension of markets, fruit

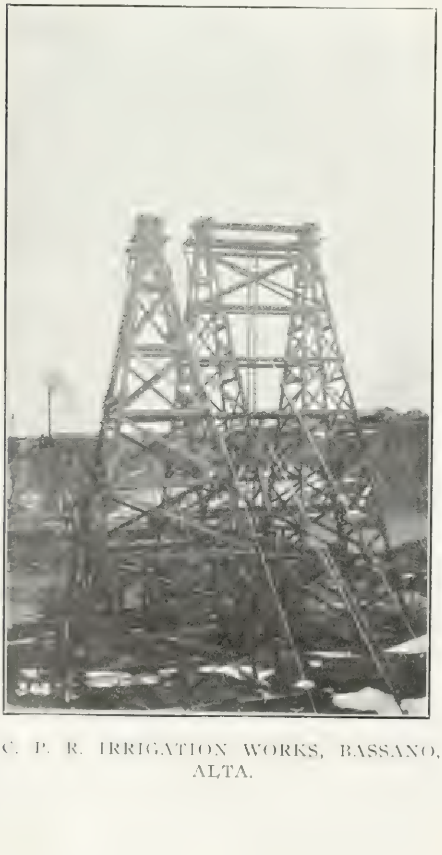


HON. ROBERT LAIRD BORDEN, D.C.L., K.C., PREMIER OF CANADA and cold storage. This report may be had free on application to the Commissioner at Ottawa. Every farmer should have a copy. In transmitting this report to the Minister of Agriculture, the Commissioner, Mr. J. A. Ruddick, says in part:

"Dairying.—I am able to report excellent progress with the cow-testing movement. The interest in this subject has increased very much during the year. At first we had to urge farmers to take up the work, but now they come to us for information and the necessary blank forms for keeping records.

"The plan which you have authorized for the organization of dairy record centres is receiving hearty support in several districts. Steps have been taken to establish centres in Oxford, Peterboro and Lanark counties in Ontario, in Brome and St. Hyacinthe in Quebec, and at Kensington in Prince Edward Island.

"An investigation was begun during the summer of 1910, with a view to determining the best method of handling cream intended for cream gathering creameries. A most interesting field of inquiry has been opened up, and it is proposed to continue, with a view to concluding, the investigation during the summer of 1911.



C. P. R. IRRIGATION WORKS, BASSANO, ALTA.

"I am pleased to report that the laws relating to the manufacture and sale of dairy products are well observed, on the whole. The Inspector of Dairy Products found it necessary to prosecute only three traders for selling and two for manufacturing butter containing an excess over the legal limit of water, and two cheesemakers for 'stuffing' new cheese with old or worthless curd. A conviction was secured in each case.

"There was so little demand for the services of the official referee at Montreal during the season of 1909 that there seemed to be no justification for continuing the office, and, in consequence, there was no referee in Montreal during the past season.

"A review of the season of 1910 does not show any very marked features. The conditions, on the whole, were rather more favorable for the production of milk than they were during the previous year, and notwithstanding the continued increase in the home consumption of dairy products and a somewhat lower price for cheese, there was an increase in the total value of the exports for the fiscal year ending March 31, 1911, as compared with the preceding twelve months. The export of cream to the United States showed a very large increase, the particulars of which will be found in Part 1.

"There has been an increased demand for 'casein,' which is the trade name for the dried curd of skimmed milk, for which new uses are being discovered every day. The price has risen sufficiently to make casein a profitable byproduct of the separator creamery, and it seems probable that this product may become an important source of revenue. As casein can only be produced at a separator creamery, it would seem as though the revenue to be derived from it may be an important factor in preventing separator creameries from adopting the cream-gathering plan, or even to encourage cream-gathering creameries to adopt the separator plan.

H. R. H. THE DUKE OF CONNAUGHT, K.G., AND FAMILY

"This branch has for several years operated a demonstration creamery at Scotsburn, N. S. The quantity of butter manufactured was very small at first, but by degrees the patrons have become educated in dairying methods, and the output is now growing rapidly. The quantity of butter manufactured was twice as large in 1909 as it was in 1908, and three times as large in 1910 as it was in 1909, the output from April 1 to December 31, 1910, being 107,715 lbs. The patrons, who are also the owners, assumed full charge of the creamery on January 1, 1911, and I am informed by the manager that he expects to double the output again this year. The creamery is now the largest in the maritime provinces.

"Extension of Markets.—The work in this division has been along the same lines as for several years past, except in so far as experience enables us to improve our methods. The cargo inspection was extended to Prince Edward Island in 1910. An inspector was located at Charlottetown, who himself followed the fortnightly shipments of cheese to Halifax, via Pictou, and saw them stowed in the ocean steamer. This supervision resulted in certain improvements being made in the handling of the cheese between the factories on the island and the steamer at Halifax.

"The usual supervision was exercised over all the iced car services and the export of perishable products.

"A systematic attempt was made in September last to test the markets of Great Britain as an outlet for Canadian peaches. Mr. W. W. Moore, chief of the extension of markets division, personally supervised the packing and transportation of these trial shipments.

"The peaches were landed in Great Britain in excellent condition and sold for good prices, netting the growers about three times as much as they could have obtained in the local markets after all expenses incurred by the department were deducted. These trial shipments have demonstrated conclusively that peaches of certain varieties can be successfully laid down on the Old Country markets. Full particulars of the shipments will be found in Bulletin No. 27 of the Dairy and Cold Storage Series.

"A large amount of work has been done through this division in compiling statements showing prices of various farm products, in different markets on this continent, and also in the United Kingdom, for several years past. A few of the tables prepared will be found in Part 2. We have increased our facilities for collecting such information during the year, and we propose to give rather more attention to this kind of work in future. Some tables will be found in Part 2.

"Fruit.—The apple crop of 1910, except in British Columbia, was the smallest for several years, and high prices have prevailed. The crop was characterized by a large percentage of clean, highly-colored, well-matured fruit. The orchards that were thoroughly sprayed turned out so well in comparison with others not sprayed, that growers have had a most excellent object-lesson on that point. The indications are that much more spraying will be done during the coming season than ever before.

"A new fruit inspector was appointed at Prince Rupert during the year.

"The total number of packages inspected was nearly as large as in 1909, and on account of the comparatively small crop, a very much larger percentage of the total packages was examined than ever before.

"There were 60 convictions for illegal marking and packing of fruit in 1910, as compared with 216 in 1909.

"Acting on your instructions, I arranged for the selection and packing of 150 boxes of Fameuse and McIntosh Red apples, which were forwarded to

ARMSTRONG'S TOBACCO PLANTATION, KEREMEOS, B. C.

EXHIBIT AT NEW WESTMINSTER FAIR, 1911

the Brussels Exhibition on October 8 last. They were specially packed to avoid bruising, and I am informed by the Exhibition Commissioner at Brussels that they arrived in perfect condition and were greatly admired by those who had an opportunity of sampling them.

"We have also collected over 1,200 boxes of apples for the Festival of Empire Exhibition to be held in London this year. These apples were, as far as possible, packed in the orchard and sent direct to cold storage. They have recently been examined and are still in perfect condition.

"The monthly fruit crop report was issued from May to October, as usual. The publication of this report involves a large amount of routine work, and it requires constant attention to keep up an active list of correspondents.

"Cold Storage.—The offer of a bonus of $100 for the erection of cold storages at creameries was continued throughout the year. The bonuses are paid only in those cases where the cold storage is constructed according to the plans supplied by this office, or according to others of equal sufficiency. An inspection is made previous to payment of the bonus.

"The three iced car services for the carriage of fruit, cheese and butter respectively, were arranged for, as usual, with the railway companies.

"The arrangement by which cold storage chambers were reserved on certain steamers for the carriage of fruit only was again carried out, covering eleven steamers sailing from Montreal between September 8 and October 1, to London, Liverpool, Glasgow and Bristol. The quantity of tender fruit exported in 1910 greatly exceeded that of any previous year, and the quantity of fruit of all kinds exported in cold storage was very much larger than ever before. Full details of these shipments will be found in Part 4.

"The experiments in the cold storage of apples mentioned in last year's report was concluded during the period under review. Some of the apples were sold in Great Britain and two carloads were disposed of at Calgary, Alta.

"These experiments or trial shipments have demonstrated the following points:

"1. It is of the greatest importance that apples intended for cold storage should be placed therein as quickly as possible after being harvested.

"2. If the apples are carefully packed at the time of harvesting, either in barrels or boxes, they may be exported at any time during the winter without repacking.

"3. It was also clearly shown that

cold storage will not preserve apples which are bruised or injured in any way, and that the blue moulds, which cause the ordinary brown rot of apples, will develop in cold storage, if there is any injury to the skin which exposes the tissue of the apple, and the Northern Spy apples appear to be particularly susceptible to this form of decay, unless the fruit is well matured and the skin is sound.

"A full report of these experiments will be found in Bulletin No. 24 of the Dairy and Cold Storage series.

"A preliminary test of cold storage for grapes was undertaken last autumn, which will lead to further inquiry and investigation.

"The erection of cold storage warehouses, for which subsidies have been asked under the Cold Storage Act, has been more active during the past year than at any time since the act came into force. Contracts have been entered into during the year for the payment of subsidies on warehouses erected or to be erected at Halifax, N. S., Quebec, Que., Brockville, Ont., Lindsay, Ont., and Harriston, Ont. Applications have been received for subsidies on warehouses which are to be erected at Calgary, Alta., and Brandon, Man.

"Publications.—The publications of this branch for the year were as follows: Bulletin No. 24, 'Some Trial Shipments of Cold Storage Apples.' Bulletin No. 25, 'Coulommier Cheese.' Bulletin No. 26, 'Dairy Legislation.' Bulletin No. 27, 'Trial Shipments of Peaches, 1910.' Circular No. 1, 'Iced Cars for Cheese.' Circular No. 2, 'The Milk Test Act.' Circular No. 3, 'The Outlook for Canadian Tomatoes in Great Britain.'

"Plans for Dairy Buildings and Fruit Cold Storage.—This branch continues to supply, free of charge, blue prints and specifications for cheese factories and creamery buildings, for creamery cold storages and small cold storages intended for farmers' use. We also have a plan for a fruit cold storage suitable for co-operative associations. A larger number of these plans have been distributed during the year, and rather more than usual inquiry has been made for information respecting the construction of cool cheese-curing rooms."

◆

ANSWER TO PICKING UP APPLES IN OCTOBER NUMBER

There were altogether 301 apples. This number, as you will see, is exactly divisible by 7.

NEW WESTMINSTER EXHIBITION, 1911

MISSION CITY DISPLAY, NEW WESTMINSTER FAIR, 1911

Canada's New Cabinet

HON. ROBT. LAIRD BORDEN, D.C.L., K.C., Premier, was born at Grand Pre, N. S., June 26, 1854. He is the eldest son of Andrew Borden and Eunice Laird. He was married in September, 1889, to Laura, daughter of the late T. H. Bond, Halifax, N. S. He received his education at Acadia Villa Academy, Horton, and was professor for a time in Glenwood Institute, New Jersey. Returning to Nova Scotia he studied law and was admitted to the Bar in 1878. Before moving to Ottawa he was the head of the law firm of Borden, Ritchie & Chisholm, Halifax, and for ten years he was the president of the Nova Scotia Barristers' Society. He was created a Queen's Counsel in 1900, and received the honorary degree of LL.D. at Queen's University in 1903, and the same degree in 1905 from St. Frances Xavier. He was elected to the House of Commons in 1896 and 1900 for Halifax, but was unsuccessful in the elections of 1904. Mr. Edward Kidd, M.P. for Carleton, Ont., resigned, and he was elected for that constituency by acclamation on February 4, 1905. At the general elections of 1908 he was re-elected in Carleton by a large majority, and he was also elected in Halifax, heading the poll. This year his majority was considerably reduced. He was elected leader of the Conservative party in the House of Commons in 1901, and he has made several political tours of the country in addition to the present campaign. He is a member of the Church of England. His recreations are golf, cricket and fishing.

THE HON. MARTIN BURRELL, Minister of Agriculture, was born October 15, 1858, at Faringdon, Berks, England, of English parentage. He was educated at St. John's College, Hurstpierpoint. The new minister came to Canada first in 1883 and was engaged in fruit farming in the Niagara Peninsula until 1889. He then went to British Columbia, where he engaged in the same business. In 1904 he first contested the Yale-Cariboo division of British Columbia in the Conservative interest, but was defeated. He was successful, however, in 1908. Mr. Burrell is a member of the Church of England, and his address in British Columbia is at Grand Forks.

THE HON. W. T. WHITE, Minister of Finance, was born in 1866 near Oakville, Ont. He worked on his father's farm, attended public and high school, and at 16 entered Toronto University. After two years his course was interrupted by financial considerations. He became a reporter on the Evening Telegram, Toronto, remaining there ten years; he entered the assessment department, then went back and finished his 'Varsity course, and graduated as a lawyer. His first position was as manager of the

National Trust Company at a time when the entire staff consisted of three persons. He has built the National Trust Company up, until today it has $30,000,000 of trustee assets. He has mingled in the biggest financial questions of the day, and when offered the post of Minister of Finance, had arranged his affairs so that he could greatly enlarge his financial connection. Mr. W. T. White was a coming millionaire. He is quiet, but a forceful man, well educated and broadminded, and the general impression is that he will be no man's tool.

THE HON. ROBERT ROGERS, Minister of the Interior, was born in the County of Argenteuil, Quebec, on March 2, 1864. He is a son of Lieut.-Colonel G. Rogers, and was educated at Berthier, Lachute and Montreal. He was married in 1888 to Miss Aurelia Regina Medymer. He was a general merchant for fifteen years at Charlevoix, as well as engaging in grain and mining ventures. He was an unsuccessful candidate for the House of Commons in Lisgar in 1896, but he was elected to the Provincial Legislature for Manitou in 1899. He was appointed a member of the Executive Council on October 29, 1900, without portfolio. He accepted office as Minister of Public Works on December 20, 1900, and was re-elected by acclamation. In 1903 and 1907 he was again returned. He is a member of the Church of England.

THE HON. J. D. HAZEN, Minister of Marine and Fisheries, was born at Oromocto, Sunbury Co., N. B., on June 6, 1860. He is descended from Edward Hazen, who moved from Northumberland, England, to Massachusetts in 1648, and more immediately from John Hazen, who, with his brother William, came from Haverhill, Mass., and settled at Portland, St. John, one year before the American colonies became the United States. He is a son of the late James K. Hazen, and his mother was a daughter of the late Hon. J. A. Beckwith. He was educated at Fredericton, and at the University of New Brunswick, where he gained his degree of B.A. in 1879 and his B.C.L. in 1890. He married Miss Ada Tibbits, of Fredericton, in 1884. He was called to the Bar in the previous year. He is a member of the Senate of the University of New Brunswick, and Registrar and Treasurer of the university in 1882 to 1890. He was returned to the House of Commons in 1891 for St. John city and county, but he was an unsuccessful candidate in 1896. He was elected to the local legislature for Sunbury in 1899, and re-elected in 1903 and 1908. In 1899 he was chosen leader of the Opposition, and in March, 1908, he succeeded in giving a bad defeat to the Robinson Government, having 31 supporters, as against 12 adherents of the Government. Upon the resignation of Premier Robinson and his colleagues, Mr. Hazen was summoned by the Lieut.-Governor

ARMSTRONG DISPLAY, NEW WESTMINSTER FAIR, 1911

FIRST PRIZE DISTRICT DISPLAY, NEW WESTMINSTER FAIR, 1911

to form a government. He did so, he himself taking the portfolio of Premier and Attorney-General. The Cabinet members were all re-elected in April, 1908. He is a member of the Church of England.

The Hon. Geo. E. Foster, Minister of Trade and Commerce, was born in Carleton county, New Brunswick, on September 3, 1847. He has had one of the most chequered political careers of all those who are now returning to Ottawa.

He is the son of the late John Foster, of Apohagri, N. B., of U. E. Loyalist descent, and Margaret Foster, and married Adelini C., daughter of Mr. Milton Davies, banker, of Hamilton, on July 2, 1899.

The family having removed to Kink's county, N. B., Mr. Foster received his education at the Common and Superior Schools there, and later entered the University of New Brunswick in 1865, where he won the King's county scholarship and various honors and medals, taking his degree of B.A. in 1868. He taught in various High Schools and seminaries of learning, and in 1871 was appointed professor of classics and ancient literature in the University of New Brunswick. Shortly afterwards he prosecuted his studies in Edinburgh, Scotland, and Heidelberg, Germany, resuming his duties at New Brunswick University in 1873, and remaining there until 1879. He holds the honorary degrees of D.C.L. from Acadia College (1885) and LL.D. from the University of New Brunswick (1894). He was elected to the House of Commons for King's county as Independent-Conservative at the general election in 1882, but his election was declared void on petition. He was, however, elected again by a larger majority. He became a member of Sir John Macdonald's Government on December 10, 1885, as Minister of Marine and Fisheries. At the by-election caused by his acceptance of office, he was opposed by Col. Domville, and elected by a majority of 368. He was re-elected at the general elections of 1891. He was returned for York, N. B., at the general elections of 1896 by a large majority. He was defeated in St. John city at the general election in 1900, and again at a by-election in North Ontario, March 10, 1903. He was first elected to his present seat (North Toronto) in 1904, with a majority of 112. In 1908 this was increased to 389, and this year to 2,000. He succeeded Sir Charles Tupper as Minister of Finance on May 29, 1888, and held that office during the Abbott, Thompson, Bowell and Tupper administrations. He was leader in the House of Commons during the session of 1895 up to the entry of Sir Charles Tupper. In 1891 he went twice, with Sir John Thompson and Sir Charles Tupper, to Washington, with an unlimited offer of reciprocity, but was unsuccessful. In 1892 he visited the West Indies in the interest of reciprocal arrangements for the extension of trade. He visited England twice as Minister of Finance for the purpose of effecting loans.

He introduced a resolution in 1883 affirming the principle of prohibition, and one in 1890, which was carried, appointing a Royal Commission on the liquor traffic. In 1891 he introduced and passed the existing Bank Act, which made provision for the currency of all bank notes without discount throughout Canada, for the guarantee of full payment of all notes of issue, and the superintendent of a bankers' association.

THE HON. W. J. ROCHE, Secretary of State, is of Irish parentage, being a son of W. E. Roche, merchant, who came to Canada from Wexford, Ireland. He was born at Clandeboye, Ontario, November 30, 1859. He was educated at Lucan public school and London high school, and attended Trinity Medical College, Toronto, for two years, and took his final year at Western University, London, Ont., graduating there with first-class honors in 1883. In the same year he went west to Minnedosa, Man., and still practises medicine there. He was Territorial representative for the Manitoba Medical Council, 1885-1901. He was Grand Master of the I. O. O. F., province of Manitoba, for one year, and Grand Representative to Sovereign Grand Lodge, held at Chattanooga, Tenn., and Atlantic City, N. J. He was married in 1883 to Annie E., daughter of the late William Cook, Toronto. He was an unsuccessful candidate for the Manitoba Legislature at the general election of 1892. He has represented Marquette in the Dominion House ever since 1896. In 1901 he was elected Conservative whip for the West. He is a member of the Church of England.

THE HON. F. D. MONK, Minister of Public Works, was born in Montreal on April 6, 1856. He was the fourth son of the late Hon. Samuel Cornwallis Monk, a judge of the Court of Queen's Bench for the province of Quebec, and Rosalie Caroline Debartch, his wife. His father was of English descent, the family having come originally from Devonshire, and his mother's people from France, settling in New France, under the French regime. He was educated at Montreal College, and graduated in law at McGill University. He was called to the Bar in 1878, and was created Queen's Counsel in 1893. He is professor of constitutional law in the Montreal branch of the Laval University, which has conferred upon him the degree of D.C.L. He married in 1880 Marie Louise, the only daughter of the late D. H. Senecal, advocate. He has been twelve years a

AT THE 1911 EXHIBITION, NEW WESTMINSTER, B. C.

PENTICTON DISPLAY, NEW WESTMINSTER FAIR, 1911

school commissioner for the city of Montreal.

He was first elected to the House of Commons from Jacques Cartier county in 1896, and has been elected in 1900, 1904, 1908 and 1911 as well. This year his majority was 1,200. In 1901 he was elected Opposition leader for the province of Quebec in the House of Commons, resigning that position in 1903.

He is a Roman Catholic in religion.

The Hon. Frank Cochrane, Minister of Railways, was born on November 18, 1852, at Clarenceville, Quebec, and was educated at the separate school in the parish of St. Thomas, Que. He is of Scottish-Irish parentage, his father being Robert Cochrane (Scottish), and his mother Mary Ann Hunter (Irish). On August 16, 1882, he was married to Alice Levina Dunlop. He was a resident for many years of Sudbury, Ontario. His first election to the Provincial Assembly was from his present constituency by acclamation, and he was re-elected in the general election of 1908 for the newly-created constituency of Sudbury, where he has still important business interests. He is a Methodist.

The Hon. C. J. Doherty, Minister of Justice, was born on May 11, 1855, at Montreal. His parents were the Hon. Marcus Doherty and Elizabeth O'Halloran, both Irish. He was educated at the Christian Brothers' School, St. Mary (Jesuit) College, McGill University, all at Montreal. In the course of his scholastic career he amassed the following degrees: B.A., St. Francois Xavier College, New York; B.C.L., McGill University, 1876; D.C.L., McGill University, 1892; LL.D., Ottawa University, 1895. On June 6, 1888, he was married to Catherine Lucy Barnard, a daughter of the late Edmund Barnard, K.C. Besides his profession of advocate, he is a director of the Montreal City and District Savings Bank. He was a captain in the 65th Mount Royal Rifles, and retired, retaining rank, in 1887. He was judge of the Superior Court, province of Quebec, from October, 1891, to November, 1906, when he retired. He was a candidate for the representation of Montreal West in the Quebec Legislature, December, 1881, and for Montreal centre in 1886, but he was defeated both times. He was first elected to the House of Commons at the general election in 1908, but his majority of 79 in that election was increased to 524 this year.

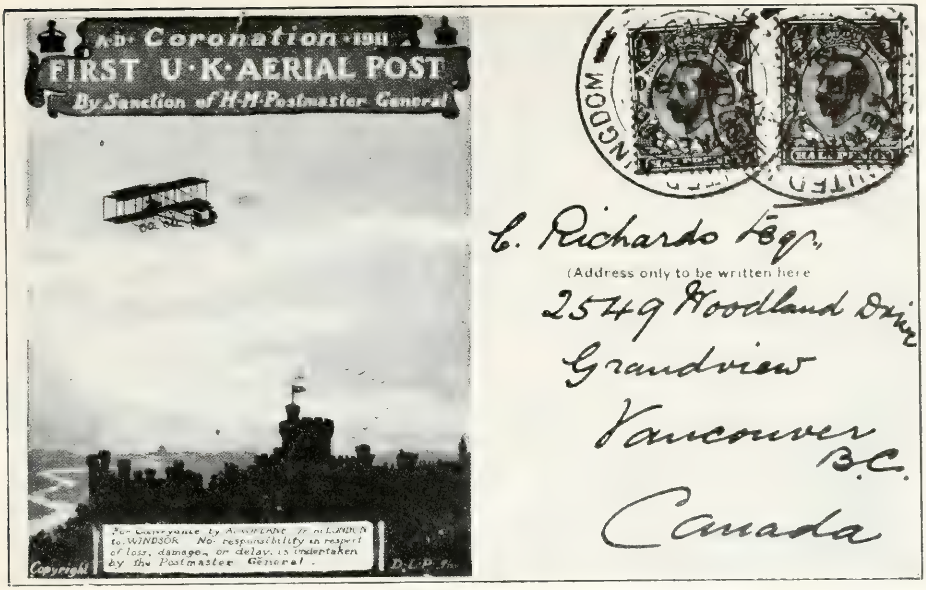
He is a Roman Catholic.

The Hon. L. P. Pelletier, Postmaster-General, was born in Trois Pistoles, Que., in 1857. He was educated at the St. Anne's College and Laval University, taking the Marquis of Lorne gold medal at the latter institution. He was called to the Legislative Council in 1888, and on the formation of the De Boucherville Government, acted as Attorney-General under Mr. Flynn. He was defeated for the Legislative Assembly in 1908, and in the same year for the Dominion Parliament for Lotbiniere. He is a resident of Quebec city.

THE HON. SAMUEL HUGHES, Minister of Militia, is the son of John Hughes, a native of Tyrone, Ireland, and his wife, Caroline Laughlin, of Scotch-Irish Huguenot descent. He was born in Darlington, Durham county, Ontario, on January 8, 1853, and was educated at the public schools, Toronto Model and Normal Schools and Toronto University. He was lecturer in English language, literature and history in Toronto Collegiate Institute till 1885, when he purchased the Lindsay "Warder," which he edited till 1897. He declined the position of Deputy Minister of Militia in 1891, and of Adjutant-General for Canada in 1895. He was appointed Lieut.-Colonel commanding the 45th Battalion on June 9, 1897. He took part in the celebration in London, England, of the Queen's Diamond Jubilee, June 20, 1897, receiving a medal. He is president of the Dominion Rifle Association, president of the Standing Small Arms Committee for Canada, Railway Intelligencer Officer, Headquarters Staff. He served in the Fenian Raid of 1870, obtaining a medal, and made personal offers of colonial military assistance to the Empire in Imperial wars. He offered to raise corps for the Egyptian and Soudanese campaigns, the Afghan frontier war, and the Transvaal war. He visited Australia and New Zealand in 1897 and 1898 in the interest of colonial assistance in Imperial wars. He served in the South African war in 1889 and 1900, first on railway transport; second, as assistant to Inspector-General Settle, in the Gordonia and Prieska campaign; fourth, in a similar position on the staff of General Sir Charles Warren, in the Griqualand West and Bechuanaland campaigns; and fifth, as commander of the Mounted Brigade in the same campaign.

He was elected to the House of Commons at a by-election held in North Victoria in February, 1892, although he had been defeated at the general election in 1891. He represented that constituency until 1904, and later was elected for the revised constituency of Victoria and Haliburton. He is a member

LOWER ARROW LAKE DISPLAY, NEW WESTMINSTER FAIR, 1911



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of the Orange, Foresters and Masonic orders. He has been twice married.

THE HON. J. D. REID, Minister of Customs, was born on New Year's Day, 1859, at Prescott, Ont., of Irish parentage. He was educated at Queen's University, Kingston, Ont., and is an M.D. of Queen's and Trinity University, Toronto. He was married in 1899 to Miss Ephie Labatt, of Hamilton, Ont. He has represented Grenville in the House of Commons continuously since his first election in 1891, increasing his majority from 635 to 1,000 at the present election.

THE HON. W. B. NANTEL, Minister of Inland Revenue, was born at St. Jerome, Que., November 8, 1857, and educated at the Seminary of St. Therese de Blainville. He is an LL.D. of Laval University. He was Mayor of St. Jerome for many years. He was first elected for Terrebonne in 1908. In 1885 he married Miss Georginna Gauthier, of St. Jerome.

THE HON. T. W. CROTHERS, Minister of Labor, was born on New Year's Day, 1850, at Northport, Prince Edward county, Ont., and was educated at the Northport public school and at Albert College, where he graduated. He is a son of William Crothers and Nancy Gray. He studied law in the offices of Messrs. Foy, Tupper & Macdonnell and Messrs. Bethune, Osler & Moss, Toronto. He was headmaster of the Wardsville High School for three years, 1874, 1875, and 1876. He has practised law in St. Thomas ever since 1880, and he is now with Mr. Samuel Price, mining commissioner for Ontario, in the firm of Messrs. Crothers & Price. He was married on July 26, 1853, to Mary E. Burns, a daughter of the late Dr. Burns, of St. Thomas, Ont. He was chairman of the Text Book Commission, appointed by the Ontario Government in 1907 to inquire into the price of text books for the public and high schools. He was an unsuccessful candidate for the representation of West Elgin in the Ontario Legislature in 1879, being defeated by the late Dr. Cascadden by a majority of seven. The elections of 1908 first sent him to the House of Commons, and 1911 sealed the verdict with a majority of 872. He is a member of the Methodist Church.

THE HON. GEORGE H. PERLEY, Minister without portfolio, was born on September 12, 1857, at Lebanon, New Hampshire, his parents being William Goodhue Perley and Mabel E. T. Stevens, both of Welsh descent. Mr. Perley received his education at the Ottawa Grammar School, St. Paul's School, Concord, N. H., and Harvard University, where he got his degree in 1878.

He was married on June 4, 1884, to Annie Hespeler Bowlby. He is a lumber merchant, a director and vice-president of the Canada Atlantic Railway Company for many years, a director of the Bank of Ottawa, an ex-president of the Rideau Club, and of the Ottawa Golf Club. He was chairman of the Ottawa and Hull Fire Relief Fund in 1900.

In 1900 he unsuccessfully contested Russell for the House of Commons, and in 1902 at a by-election in Argenteuil he met the same fate, but in 1904, 1908 and 1911 the latter constituency revised its opinion and selected him as their representative. This year he got 1,550, double his former majority. He is a member of the Church of England.

THE HON. J. A. LOUGHEED, Minister without portfolio, was born in Brampton, Ont., in 1854, but resided in Toronto till 1882. In 1884 he married the eldest daughter of the late William Hardisty, chief factor of the Hudson's Bay Company. Mr. Lougheed first practised law in Toronto, and continued to do so on his removal to Calgary in 1883. In 1899 he was made a Queen's Counsel by the Dominion Government and summoned to the Senate. On the retirement of the Hon. Sir Mackenzie Bowell from the leadership of the Conservative party in the Senate during the session of 1906-7, Senator Lougheed was chosen as his successor, and has continued to lead that body for his party ever since. Mr. Lougheed's home is in Calgary, Alberta.

THE HON. A. E. KEMP, Minister without portfolio, was born at Clarenceville, Que., on August 11, 1858. He was educated at Clarenceville, Quebec, and Lacolle Academy. He has been president of the Canadian Manufacturers' Association and of the Toronto Board of Trade. He was elected to the House of Commons in 1900, again in 1904, but was ousted from the seat for a season with a majority of 75 votes, by Mr. Joseph Russell, who ran as an Independent Conservative. However, this year he regained the seat, emphasizing the fact by getting a majority of 4,759. He married a Miss Wilson, of Montreal.

PHILOSOPHICAL

He was a man of convivial habits, well known by his Christian name, Jamie.

One dark night an acquaintance found Jamie lying at the foot of an outside stair.

"Is that you, Jamie?" he asked in a voice of the greatest astonishment.

"Aye, it's me," replied Jamie, in a resigned tone.

"Have you fa'en doon the stair?"

"Aye!" said Jamie. "I fell doon; but I was comin' doon, whether or noo."

BURQUITLAM DISPLAY, NEW WESTMINSTER FAIR, 1911

Our Ottawa Letter

FROM OUR OWN REPRESENTATIVE AT THE NATIONAL CAPITAL

LOCAL fruit dealers report that Baldwins and Spies are scarce, while other sorts are mostly undersized, although color and flavor are generally good and the supply is fair. The present week sees practically the end of peaches in this market, and pears are finished with for another year. Prices all through the season have been a fairly good average, and dealers have no reason to complain, a remunerative business being done. California's big orange crop is considered likely to keep the prices of apples rather lower than they would otherwise have been this fall and coming winter, but not low enough to affect growers' interests to any extent worth noticing.

The shipments of Canadian apples received at Glasgow this fall show a slight increase over the corresponding period last year. The prices secured were very fair for colored varieties. The demand for green apples, however, was not very keen, as moderately large supplies of English green varieties of excellent quality were on the market, and, according to late reports, expected to continue so for some little time.

At Leeds and Hull liberal supplies of English apples were on sale, the crop of early varieties turning out larger than was generally looked for. The native-grown fruit proved, however, to be of a varied character, some being exceedingly small, while from other home districts arrivals proved to be of a satisfactory size and quality. Several of the local firms had concluded arrangements with Canadian apple shippers for the whole of the present season, and others were in correspondence with the Leeds and Hull office of the Canadian Trade Commissioner at those ports with the same object in view. Canadian shippers who are desirous of increasing their business on the other side of the Atlantic are invited to correspond with the Trade Commissioner at Leeds, Mr. J. M. Massen, giving particulars as to the quantities they may be in a position to ship and necessary details, and the information furnished will be placed before responsible firms. It was thought that the bulk of the English supplies would be finishing about the time the first Canadian shipments of the keeping sorts would be coming in. Local merchants were handling Canadian dessert pears. The trade in this class of fruit, so far as Leeds and Hull are concerned, was initiated last year, when a number of boxes of exceptionally fine-looking fruit were consigned to Leeds and disposed of with results regarded as entirely satisfactory to the shippers and receivers interested. Several lines of Canadian canned fruit were attracting attention in the Leeds and Hull markets. A progressive trade was being done in canned apples, in tins holding approximately one gallon. They are supplied mainly to restaurants, hotels and boarding-houses, and at present three Canadian brands are for sale. Canned Bartlett pears of Canadian origin have been introduced.

From Bristol we learn that English apples were selling at the following wholesale prices: Morgan Sweets, six shillings and sixpence a hundredweight; large cooking, ten shillings; good cooking, eight shillings; Worcester Pearmains, eighteen shillings, and other dessert sorts at eighteen to twenty-four shillings.

Dairy Commissioner Ruddick in his last fruit report mentions a shipment of Bartlett pears from Cobourg, Ont., sold recently at Montreal at 50 cents to $2 a barrel, the former bruised and badly damaged. Californian Bartlett pears in boxes were sold at the same time and place at $2 a box. The Ontario fruit as packed was superior in quality to the Californian, the money difference being almost wholly a question of packing. Some allowance, Mr. Ruddick says, must be made for the superior carrying quality of the drier Californian fruit, but on the other hand, the advantage was with the Canadian shipper in point of time and distance, so the latter lost the difference between $2 a barrel and $2 a box by not observing proper methods in packing. It is useless to expect good returns from Bartlett pears packed in barrels. The matter is considered worth mentioning, for the reason that bad packing is an injury to every fruit-grower in Canada, because it depresses the market for Canadian fruit.

Apples from Manitoba: a box of apples has been received at the Dairy and Cold Storage Commissioner's office from Mr. A. P. Stevenson, of Dunston, Manitoba. The fruit was of the Duchess variety and of large size and fine quality. Mr. Stevenson reported a very good crop.

The Canadian Commissioner at the Festival of Empire Exhibition at London, England, has reported that the apples collected in Canada by the Dairy and Cold Storage Branch made the finest exhibition he ever had. Several varieties, although a year old, were still in good condition. Arrangements were being made at the time the last monthly report of the branch was issued to forward to London several hundred boxes of Fameuse, McIntosh Red and Gravensteins, "three of the very finest dessert apples in the world." Some of these were to be packed in single-layer cases, surrounded with wood wool.

In the annual report of the Dairy and Cold Storage Commissioner, published since my last letter to the *Fruit Magazine, Scientific Farmer and Canadian Citizen,* the Commissioner says the apple crop of 1910, except in British Columbia, was the smallest for several years, and high prices prevailed. The crop was characterized by a large percentage of clean, highly-colored, well-matured fruit. The orchards that were thoroughly sprayed turned out so well, in comparison with others not sprayed, that growers have had a most excellent object lesson on that point. The indications are that much more spraying will be done during the coming season than ever before.

In the export fruit trade the total shipments of Canadian apples for the year ending March 31, 1911, amounted to only 523,658 barrels, valued at $1,756,884, against 1,604,477 barrels in the preceding year, valued at $4,417,926. The large reduction in the exports was caused, of course, by an exceptionally light crop and increased shipments to the western provinces. Prices ruled high in Great Britain throughout the season, and as a consequence a larger percentage of lower grades was shipped from this country. At the close of the season, however, general satisfaction was expressed by receivers regarding the grading and packing of Canadian apples. A feature of the Old Country markets was the relatively large quantity of boxed apples from Virginia and from the far western States of California, Oregon and Washington. Some very fine specimens of Canadian Spies in boxes were sold on the Glasgow market during the late fall and winter, one lot in particular realizing higher prices than a parcel of U. S. Newton Pippins sold at the same time and place. Some of the reports sent in by Canadian cargo inspectors at British ports include references to the consignments of fruit received from Canada that will greatly interest readers of the *Fruit Magazine, Scientific Farmer and Canadian Citizen.* The inspector at Liverpool, Mr. W. Carter, for instance, says the season of 1910-11 was one of the poorest for Canadian apples for many years. This applies particularly to the shipments arriving during the first ten weeks of the season, the fruit showing small and very short of color. There was an improvement in the quality when the winter varieties began to arrive, but even then they were not up to the usual Canadian standard. Owing to the scarcity, they realized exceptionally high prices nearly all the season, but had some of the apples that arrived late in January and early in February been shipped in time for the Christmas market, they would have done better still. An effect of the shortage of Canadian apples has been to introduce to the Liverpool market large quantities of box apples from Washington, Illinois, and other parts of the States. Most of these were handsome apples, exceedingly well packed and graded, and they realized such good prices that buyers say heavier shipments may assuredly be looked for during the season of 1911-12. In fact, these apples look like becoming serious rivals of the Canadian product, and Canadian packers must see that their fruit is thoroughly well packed and graded in future. There was very little complaint of frozen apples from Canada, nothing but good barrels having been used. There was little or no complaint during the season with respect to branding. The few shipments of peaches were landed in good order, being sound and very well packed, but they showed poor keeping qualities, many of them turning black after being landed two or three days. In Mr. Carter's opinion, some of them were too green when packed, and were carried at too low a temperature. He thinks 38 to 40 degrees low enough for tender fruit like peaches. It must also be borne in mind that there is a very limited market for peaches, and that the supply must be carefully regulated.

Mr. James A. Findlay's report (Glasgow) on apples was very similar in character. The shortage from Canada, Mr. Findlay says, was partly met by increased arrivals from other sources, but not in sufficient quantities to satisfy the demand, consequently prices ruled high. The result was larger importations of barrel stock from various districts in the United States. The Virginia fruit was of excellent quality, Maine Baldwins very fair, but western apples poor in size and quality. Larger quantities of box fruit from California, Oregon, Washington, etc., also arrived, the Oregon Newton and Spitz being of excellent quality and pack, and receiving universal praise. The box apple trade of Glasgow, Mr. Findlay states, is one of increasing dimensions, and last year's trade indicates that Glasgow offers an outlet for a large proportion of high-class boxed fruit at all periods of the recognized apple season. Boxes containing apples characterized by uniformity of size and color, with skins free from blemish and clean for the variety, fairly bold in size, but not exceedingly so, nor irregular in shape so as to be deemed coarse, will return to shippers a much enhanced price over the barrel equivalent. Buyers are becoming increasingly discriminating regarding value of appearance, and if Ontario orchardists are going to capture and retain a portion of this high-class box trade, decidedly more scientific care of orchards and more careful selection of fruit will be found essential. The inspector is satisfied that an increased quantity of boxed Ontario apples can be absorbed by the Glasgow market, and it lies with the Ontario packers to cater for the Scotch consumer's eye as well as his palate. The popularity of the Canadian King, Spy and Baldwin on the Glasgow market is admitted on all hands, and granting the excellence of flavor of these varieties, buyers are influenced by uniformity of size, evenness of color and cleanness of skin. The most popular size of Oregon Newton Pippins in Glasgow is from 96 to 112 apples per 40 lb. case, the latter size preferred. There were direct shipments of 1,653 boxes of apples during the season from British Columbia. They arrived in good condition and participated in the high prices ruling. One parcel from Kelowna district composed of Jonathan, Spitz, Newton Pippin, McIntosh Red and Grimes Golden, was of excellent quality and condition.

Mr. Thomas E. Davies, inspector at London, reports as follows on apples:

"The Ontario crop shipped to London has been lighter than usual and the fruit has in some quarters been spoken of as lacking in quality. If, however, the price realized is any criterion of the quality, it is hardly possible to credit these reports, it being evident that if there was anything wrong with the fruit the retailers would never have paid such high figures as we have witnessed this season. Appearance is almost everything in the higher grades of Ontario fruit and it is evident that the quality must have been pretty well up to the standard when such a price as 25s. per barrel has been recorded. In passing, I think it only right to express the view that some of the growers would be better advised in placing their consignments only in the hands of salesmen of good standing and established repute. There is a tendency amongst some of the growers to be led away by specious advertisements put forward by parties who have little experience in the trade and are only concerned to get hold of the fruit with the sole object of making as much as possible for themselves and with little or no regard to the sender's interests.

"Nova Scotian apples have also realized high prices throughout the season, and, whilst to a large extent this is doubtless due to the fact that the crop has been light and the demand keen, it must also be said that the condition and quality have in the main been well up to standard. This brings me to the subject of my last year's report, and the current rumors that next season will, in all likelihood, produce a very large crop of fruit in Nova Scotia, and possibly in other quarters also. If this is realized, growers cannot expect a return on their outlay which can compare with the season just closing.

"Whenever there is a bumper crop, it would be most advisable that steps should be taken to develop fresh markets at outlying ports and towns conveniently accessible from London. This would be far better than leaving such work to the London salesmen, which simply means that a number of London local charges are incurred on the fruit quite unnecessarily and the extra handling to and from market is also detrimental. I am emphasizing this point once again as it is a matter which should be of great interest to the growers, and it is no use being wise after the event. The system can be worked by means of through bills of lading."

A London cable quotes a Covent Garden fruit merchant to the effect that the experimental shipments by the Dominion Government of Canadian peaches for the London market has been instrumental in drawing the attention of fruit buyers to this Canadian product. This season, largely increasing shipments had been arranged for and a total of about 14,000 cases would be received from the Niagara district.

CHILD LIFE

MR. LUTHER BURBANK says that all animal life is sensitive to environment, and of all living things the child is the most sensitive.

Surroundings act upon it as the outside world acts upon the plate of a camera, he tells us in his "Training of the Human Plant." Every possible influence will leave its impress upon the child, and the traits which it inherited will be overcome to a certain extent, in many cases being even more apparent than heredity. The child is like a cut diamond, its many facets receiving sharp, clear impressions, not possible to a pebble, with this difference, that the change wrought in the child from the influences without becomes constitutional and ingrained. A child absorbs environment. It is the most susceptible thing in the world to influence, and if that force be applied rightly and constantly when the child is in its most receptive condition, the effect will be pronounced, immediate and permanent.

Where shall we begin? Just where we begin with the plant, at the very beginning. It has been said that the way to reform a man is to begin with his grandfather, but begin with his grandfather when he is a child. I find the following quoted from the great kindergartener Frobel:

"The task of education is to assist natural development toward its destined end.

"As the beginning gives a bias to the whole after-development, so the early beginnings of education are of most importance."

While recognizing the good that has been accomplished in the early kindergarten training of children, I must enter a most earnest protest against beginning education, as we commonly use the word, at the kindergarten. No boy or girl should see the inside of a schoolhouse until at least ten years old. I am speaking now of the boy or girl who can be reared in the only place that is truly fitted to bring up a boy or a plant—the country, the nearer to Nature the better. In the case of children born in the city and compelled to live there, the temptations are so great, the life so artificial, the atmosphere so like that of the hothouse, that the child must be placed in school earlier as a matter of safeguarding.

But, someone asks, how can you ever expect a boy to graduate from college or university if his education does not begin until he is ten years of age? He will be far too old.

First I answer that the curse of modern child life in America is over-education. For the first ten years of this, the most sensitive and delicate, the most pliable in the world, I would prepare it. The properly prepared child will make such progress that the difference in time of graduation is not likely to be noticeable; but, even if it should be a year or two later, what real difference would it make? Do we expect a normal plant to begin bearing fruit a few weeks after it is born? It must have time, ample time, to be prepared for the work before it. Above all else, the child must be a healthy animal. I do not work with diseased plants. They do not cure themselves of disease. They only spread disease among their fellows and die before their time.

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THE YOUTH'S COMPANION IN 1912

No other paper is like the "Youth's Companion." It is taken in half a million homes, where the choice of reading is made with as much care as the choice of friends.

For years the "Companion" has enjoyed contributions by distinguished men and women of Great Britain and Canada. Among those already engaged to write for the 1912 volume are General Baden-Powell, who has something of interest to say about the boy scout movement; Sir Harry Johnston, who recalls the last of the great South African hunters; William T. Stead, Jerome K. Jerome, Jane Barlow, Frank T. Bullen, Rev. W. J. Dawson, Richard Whiteing, Sir James Crichton-Browne, and the Duke of Argyll, former Governor-General of Canada.

The Fruit Magazine, Scientific Farmer and Canadian Citizen and the "Youth's Companion" make a strong team.

A POOR WITNESS

A small Scottish boy was summoned to give evidence against his father, who was accused of making disturbances on the street. Said the magistrate to him:

"Come, my wee mon, speak the truth and let us know all ye ken about this affair."

"Weel, sir," said the lad, "d'ye ken Inverness street?"

"I do, laddie," replied his worship.

"Weel, ye gang along it, and turn into the square, and cross the square —"

"Yes, yes," said the judge, encouragingly.

"An' when ye gang across the square ye turn to the right and up into High street, an' keep on up High street till ye come to a pump."

"Quite right, my lad; proceed," said his worship. "I know the old pump well."

"Weel," said the boy, with the most infantile simplicity, "ye may gang an' pump it, for ye'll no pump me."

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When the first shipment of frozen eggs arrived in London from Australia their extreme hardness astonished the brokers. One man calling at a shipper's office was amazed to see him taking aim at the wall with an egg. "What the dickens are you at?" he said. The broker let drive, the only result being a slight dint in the wall. The thing being explained, the man took a couple of the eggs, put them in his pocket, and left to startle his wife. Arriving home, he waited till the family was assembled for dinner, and then banged an egg at the new dado. But the smile quickly faded from his face. The egg had thawed!

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Mrs. Hen, having performed her oviparous function, took a constitutional around the yard. Returning to her nest she found it empty and clucked angrily.

"What's the trouble, ma'am?" asked the rooster.

"It's mighty funny," she grumbled, "that I can never find things where I lay them."

Mincemeat and Christmas Pudding Recipes

Contributed to The Fruit Magazine, Scientific Farmer and Canadian Citizen by Mr. Harry Beach

CHRISTMAS will soon be with us, and many housewives prepare their mincemeats and other delicacies this month, each having her own particular way and ingredients. I do not intend her to set down any hard-and-fast rule for the preparation of any one kind. The following recipes will be found simple, satisfactory and helpful to those who are already acquainted with mincemeat-making. There are as many ways of making mincemeat as weeks in the year, but all contain more or less the same ingredients. The use of spirits, while they help to preserve, is disliked by many, while some add stout and beer. Vegetarians will have neither meat nor suet. These can be left out and nuts and vegetable oils substituted. The longer mincemeat is kept the better it becomes in flavor, always improving with age.

MINCEMEAT.—Use good tart apples; chop moderately fine. If it is desired to have the apples show white in the finished meat drop them into a basin of cold water to which a small quantity of salt has been added, keeping the apples wet with the solution. While chopping be careful to remove cores and seeds. Wash and clean the raisins and currants, hand-picking to remove stones. Chop the orange and lemon peel very fine and the citron coarse. Select good, fresh, firm suet; trim out all kernels, meat, bloody parts and the larger strings. Meat as cooked by many simply forms a tasteless and expensive filling. To cook meat properly it must be first plunged in a *boiling hot* solution of salted water (1½ tablespoon of salt to a quart of water), then changed to an ordinary solution, where the cooking is finished. Trim out all fat and gristle and chop quite fine. In mixing, always first mix the apples and suet, then spread out over the bottom of pan and add the other dry ingredients in even layers. Turn over with a wooden spoon. Make a syrup (sugar and water), add other juices (if recipe calls for it), turn over again, then allow to soak 24 hours, or long enough for the fruit to swell out plump; mix again and store away in glass jars or anything suitable.

MINCEMEAT NO. 1.—2 lbs. sugar, 2 lbs. meat, 2 lbs. apples, 3 lbs. raisins, 2 lbs. currants, 1¾ lbs. suet, ½ lb. lemon, ½ lb. citron peel, 1 quart brandy, juice of 4 lemons and grated rind of 3, 1 tablespoon cinnamon, 3 nutmegs, 1 teaspoon cloves (ground), salt to taste, 2 lbs. sugar. Cider may be substituted for brandy.

MINCEMEAT NO. 2.—4 lbs. fresh beef, 4 lbs. apples, 1 lb. suet, 1 lb. currants, 1 lb. raisins, ¼ lb. mixed peel. Proceed as before, chopping apples, stoning raisins, etc. Put it over a fire with 1 lb. sugar dissolved to a syrup in water, 2 quarts of cider, and ½ pint of brandy. Add, while heating, the spices as follows: 1 tablespoonful of cloves, 1 of allspice, 1 of salt, 1 of ginger, and 1 of ground mace, with 1 nutmeg grated, and the juice and rind of 1 lemon. Let it all boil together.

Christmas puddings do not exactly come under the heading of preserved fruits; but having had a number of years' experience in making these, a few recipes here, I think, will not be out of place.

CHRISTMAS PUDDING NO. 1.—1 lb. sultanas, 1 lb. suet, 1 lb. sugar, 1 lb. raisins, 1 lb. currants, ½ lb. flour, ½ lb. breadcrumbs, ½ lb. mixed peel, ¼ lb. blanched almonds cut small, the juice and grated rind of 2 lemons, 8 eggs, ½ pint milk, 2 teaspoons of baking powder, 2 pinches of salt, nutmeg, mace and cinnamon. Dry-clean the currants; clean and chop suet fine; chop peel fine; mix all dry ingredients together; beat the eggs with the milk and mix thoroughly with other ingredients, adding lemon juice. The bread can be grated on a coarse grater. Grease the basins well and fill nearly to the top. Wring the pudding cloths out of boiling water, flour them on one side and tie securely over. Put into fast-boiling water or a steamer and cook for six hours.

CHRISTMAS PUDDING WITH APPLES.—½ lb. of flour, ½ lb. of sugar, ½ lb. of raisins, ½ lb. of currants, ½ lb. of suet, ½ lb. of chopped apples, a pinch of salt and allspice, 4 eggs. Mix with a cup of milk; boil 8 hours.

SPOKANE NATIONAL APPLE SHOW

DEMONSTRATIONS of power, traction and hand apparatus and nozzles will be featured at the spraying machine competitions in connection with the fourth National Apple Show in Spokane, November 23 to 30. Gold, silver and bronze medals will be awarded in each of the classes by judges to be appointed by the American Society of Agricultural Engineers. The trials are open to the world.

The purpose of the tests and competitions is to give growers the benefits of the most approved inventions and modern improvements in spraying machinery, which has become such an important part of commercial orcharding throughout the United States and Canada, and it is thought that the competitions will do much to stimulate a more general use of apparatus for the protection of orchard and field crops, also to encourage the manufacturers who are endeavoring to supply the horticulturist with machines adequate to meet the requirements of the work to be performed.

"Perhaps no class of agricultural machinery has shown more rapid advancement during recent years than those employed to protect fruit trees from the ravages of insects and fungi," said Ren H. Rice, secretary of the National Apple Show, Inc., "and to bring out the highest development as well as the improvement of the methods of application of spraying material it has been decided to give a series of tests under proper authorization. This is assurance that the competitions will be conducted in a thorough and scientific manner, and should be of assistance to the grower in selecting machines suited to their requirements. The officials of the competitions will be experienced judges, observers, practical horticulturists and competent engineers."

Five hundred dollars in gold and a massive silver loving cup, suitably engraved, presented by the International Apple Shippers' Association, will be awarded to the exhibitor of the best packed carload entered. The total value of the prizes and premiums is $20,000. The judges will award prizes of $300 to firsts and $100 to seconds in carload contests on each of these varieties: Jonathan, McIntosh Red, Rome Beauty, Spitzenberg, Wagener, Winesap, Yellow Newtown, also on the best mixed car of standard winter varieties, each to consist of at least fifty boxes, and the best car of any standard variety not named in the foregoing. A special premium of $200 is offered for the most artistically decorated entry in the carload class.

"The trustees think this arrangement of the carload prizes will be more satisfactory to all the growers and districts than was possible by the terms of the championship contest which was heretofore a feature," said Harry J. Neely, first vice-president of the National Apple Show, Inc. "The championship prize was $1,000. It is possible for an exhibitor to receive a similar amount, besides gaining three distinct honors—winning first on pack, first in his class on variety and first for decorative features."

A LITTLE KNOWLEDGE

The wife of a literary man, it is said, once undertook to raise a brood of chickens. They turned out badly. She told a neighboring farmer's wife that they seemed to be doing all right at first, but in the course of a few days they all died in the coop. "What did you feed them?" asked the farmer's wife. "Feed them!" exclaimed the author's helpmate. "I didn't feed them; I thought a healthy young pullet like that ought to have milk enough for her chicks."

Irrigation and Drainage

By MR. F. E. JONES, New Westminster, B.C.

INTRODUCTORY

THE primary object of drainage is to decrease the excessive supply of soil water, while in irrigation the chief object is to increase the amount of soil moisture. In either case we are dealing with moisture, and a knowledge of its forms, movements and control is of great importance at the beginning of this course.

IMPORTANCE OF SOIL MOISTURE

Of all the factors which influence growth, moisture is without doubt the most important. Plants suffer more frequently for want of proper moisture conditions than they do for want of chemical elements of plant food. Moisture is a carrier of plant food on the soil and in the plant. There is a wide range in which the moisture content will be favorable to growth, but for each soil there is a low limit at which plants wilt for want of moisture, and there is also a line of excessive wetness above which nothing but water plants will thrive. Moisture is necessary to bacteria of the soil. It gives turgity to the plant cells and makes plant food available. Amount per pound of dry matter.

SUPPLY

The amount of water in the soil is not always greater in the region of greater rainfall. Soil of wet climate may dry and bake quickly after rains. The initial amount of water will depend on the rainfall, and stored supply as for irrigation. A thing that is more important is the supply during the growing season, so the amount of rainfall is not so vital as the time of occurrence. The rate of loss and the retentive capacity of the soil will modify the amount available during the growing season.

FORMS

1. Hydrostatic water. This can be seen and is free to move by gravity. It is removed in drains. 2. Capillary moisture. It is held against the force of gravity by surface tension. It is the form used by plants. There is no distinct line between this and free water. 3. Hydroscopic moisture. This is absorbed by dry soil from the air.

LIMITATIONS

The maximum amount of the different kinds of soil moisture depends on texture, structure and content of organic matter.

MOVEMENTS

Percolation. This is more rapid in tile after small streamlets have formed in the soil about the tile, and in coarse grain soils. Run-off may remove a large percentage of the rain. Evaporation—Most of the rain not lost by percolation is lost by evaporation. Capillarity—Relieves congested condition at the surface when water first comes to the soil. Capillarity depends on gravity, surface tension and pressures. (See Bureau of Soils Bulletin No. 10.)

CONTROL OF CAPILLARITY—INCREASE BY IRRIGATION—DECREASE BY DRAINAGE

We will for the present omit the methods for increasing the moisture content of the soil, and take up the methods of decreasing the water content. The three ways of doing this are:

1. Cultivation. — We can hasten evaporation by early spring cultivation of the soil. By increasing the air circulation and leaving the soil with an uneven, rigid surface which exposes a greater surface for evaporation. Rolling a light sandy soil causes upward capillarity and increases evaporation at the surface. When rain falls on the soil it can be lost by run-off. Cultivation will check excessive run-off. It will also increase the water capacity and there will be less percolation.

2. Growth of Plants.—Crops of any sort, weeds and cover crops, will dry

the soil by transpiration of the water through the leaves. This may be taken advantage of in taking out the excess water in the early spring. We can take advantage of this in the fall, when the cover crop is planted in the orchard to take up the moisture and check the growth, so the buds will prepare for winter.

3. Drainage—Drainage consists essentially in the direct removal of gravitational water from the root zone of the soil by affording free passages for its percolation and flow. This is the chief means of decreasing the supply.

The subject of drainage is attracting more widespread attention throughout the country at the present time than ever before. It becomes more important as the agricultural resources of a country are developed. There are over 1,000,000 square miles in the United States that must be drained before they can be utilized. Thirteen per cent. of the irrigated lands of the West are already injured by alkali and are in need of drainage. A person, in order to realize the need of drainage in this valley (the Willamette) needs only to take a trip through it in the spring and see the great number of acres of land under water, and then later go over the same ground and see the light crops as a result of this lack of drainage.

HISTORY OF DRAINAGE

The history of drainage shows that various methods and materials have been used in the past, but we have now settled on one universal method. The first record of tile drainage is found in the garden of a monastery in France about 1620, where it was noticed that it was very fertile in times of drought, and that the quality and earliness of the fruit were very marked. Investigation revealed that tile 10 in. long and 4 in. in diameter were in the soil in such a manner as to form a drain at a depth of 4 ft. Each pipe was funnel shape and made to fit in the next one. How early they were placed there was not known.

In 1650 Captain Walter Raleigh published a book on drainage called "The English Improved Agriculture," in which he proposed a plan of boring down into the hard sub-strata and letting the water down into the gravelly zone underneath. In 1832 the Denston system was introduced by Mr. Smith, of Denston, Scotland. This was a system of clay pipes. In 1833 Smith published a pamphlet entitled "Smith's Remarks on Thorough Drainage." His plan was as follows: 1. Frequent drains. 2. Shallow depth, some 30 in. 3. Parallel drains at equal distances apart throughout the field. 4. Minor drains should run down the steeper places and the main drains run along the chief hollow, tributary drains being provided for lesser hollows.

In 1837 Mr. Johnson, of Geneva, N. Y., introduced tile drainage on his farm. This was the first drainage system in America and is in still successful operation. Drainage has been rapidly developed in the middle west during the last twenty years. Drainage laws and drainage machinery have helped to reclaim swampy areas in the central States.

Box, stone and brush drains have given place to tile drains, which are now in general use. There are over five thousand tile factories in the United States; some are very large. To make tile requires expensive machinery. There are few tile factories in Oregon. There is a small tile factory in Corvallis and one in Salem.

SOILS THAT NEED DRAINAGE

Soil texture and structure. These often determine the need of drainage. Clay offers great friction to the movement of water. It has a greater water capacity and is apt to have a compact puddled structure. In retentive soils the first step in improvement is drainage. Getting out the excess of moisture assists in granulation. The addition of fertilizer will only be effective after good drainage. The order of improvement should be: 1. Drainage. 2. Tillage. 3. Manure. 4. Lime.

SOIL AND SUBSOIL

Soil is the surface strata where the bulk of plant foods are found, while subsoil is the strata on which the soil rests. It is lighter in color, finer in texture and contains less organic matter. Certain proportions of gravel and clay form hardpan. Iron or lime may cement the clay and give the condition known as hardpan.

WATER ZONES

There are three zones of flow of water through the soil: 1. The saturated zone or the strata through the water moves vertically to the water table. It may move by capillarity or by percolation or both. 2. Surface zone. This is the water table. In winter the water table is very near the ~~surface~~, and in the summer the water table goes down to various depths, sometimes quite deep. 3. Deeper zone. Veins of water.

All soils must be drained, but fortunately most soils are more or less drained naturally. Natural drainage is much cheaper. The following are the conditions which require drainage:

1. Nearly flat lands upon which the water from the surrounding higher lands collects.
2. Areas adjacent to higher lands where the soil is of such a nature that water which falls on the upland will seep under and out through the low land, making it wet.
3. Lands inundated regularly by the rise of tides or frequently by the overflow of rivers.
4. Extremely flat lands in wide areas which are underlaid near the surface by a thick, close, nearly impervious clay subsoil.
5. Lands like rice lands, water meadows and cranberry marshes, where water is applied excessively and must be removed again.

In general, all low-lying fine-grained soils with fine, heavy subsoil will need drainage. Our "white land" can be improved by drainage. Most of the valley clay loam will need to be drained before it is brought to the highest state of productiveness.

BENEFITS OF DRAINAGE

1. Removes excessive water. 2. Increases the capillary supply of moisture. 3. Improves the texture. 4. Increases the root pasturage. 5. Affords better air circulation. 6. Makes the soil warmer. 7. Lengthens the growing season; firms the soil. 8. Assists decay and nitrification. 9. Prevents erosion. 10. Diminishes the effect of drought. 11. Prevents heaving. 12. Prevents the rise of alkali. Drainage does this and more. It pays in increased yields and land values. Road drainage aids in transportation. Sanitary drainage improves healthfulness. To what extent drainage is warranted depends on the crops to be grown.

KINDS OF DRAINAGE

1. Natural drainage. (a) Through gravel subsoil. (b) Through surface run-off.

2. Artificial. (a) Open drains. (b) Underdrains (brush, stone, box for alkali and tile).

The object of underdrains is to assist the action of gravity. Both surface and underdrains have their field for usefulness.

A. Open drains or surface drains are essential auxiliaries to tile for drainage of large areas. They remove water from the surface and also from the subsoil. The amount removed from the subsoil depends upon their depth and fall and the amount of water in the channel. Surface are adapted to: 1. Where the volume to be removed is large. 2. Where the water table is near the surface. 3. Where the drainage is designed to be only for a short time. 4. As a supplement to tile drainage for large areas of flat land.

The efficiency of open drains depends on the surface flow of water into the channel. A double plow should be used to make dead furrows that will serve as surface drains and as temporary storage for excessive water.

In order to drain the subsoil the ditch must be deep enough to permit percolation from the adjacent subsoil and the efficiency will depend on the texture and structure of the subsoil.

To be effective, an open drain must be evenly graded and have a smooth bottom and sides, and these side walls must be staple. A semicircular form will give the greatest carrying capacity per cross-sectional area, and will have the least surface friction. Usually the bottom will be made flat, however, and will be about one-half the width of the top.

The slope of the wall will vary with the soil. One to one slope is commonly used with clay, and one and a half to one for loam soils. Lighter soils will stand a deeper grade. The fall should be uniform and just sufficient to afford scouring without erosion or silting. Silt or sand is more susceptible to erosion than clay. Sedimentation will be less where growth of vegetation in the bottom is prevented.

When it is desired to reclaim and improve large areas of level land such tracts must be cut up into sections or districts by large open ditches, in order that tile drains may be laid in every part without necessitating the use of mains too large and costly to be profitable. While these open ditches are not desirable in themselves, since they occupy the land and divide the field into irregular shapes, yet they are necessary to every large system of drainage. They should be located with care, following the course of natural drainage as far as possible, with due regard to straight courses.

CONSTRUCTION OF DITCHES

A common method of making small open ditches is to use a team and scraper. This is a good method to use where the earth is dry enough to afford a footing. Contractors have done such work for as low as ten cents per cubic yard, where conditions were favorable. A large part of the open ditch work must be done in swamps, and where it is too wet to use a team and scraper.

For the construction of small and shallow ditches, what is known as the capstan ditch plow is used in some localities. This is an immense plow which makes a ditch by cutting and throwing the earth from the centre each way, its action being similar to a common sod plow. There are wings which push the loose earth 3 ft. away from the edge of the ditch, leaving it in a large continuous ridge on each side. The plow is pulled by two capstans, each of which is turned by a team of horses. The capstans are anchored ahead, and their winding drums are attached to the plow by winding ropes. This machine makes a clean ditch 8 ft. wide at the top, 1 ft. wide at the bottom, and ordinarily limited in depth to 2½ ft. Used in Minnesota. Contract work is taken for about one dollar per rod of completed ditch. The earth should be wet for this plow to work easily.

Steam dredges are used for the reclamation of large areas, and are of three different types. 1. Floating dredge; begins work at the upper end of the channel and works towards the outlet. There must be sufficient water in the ditch to float the boat which carries the engine and excavating machinery.

The excavated earth is deposited on each side of the ditch about 9 ft. from the edge of the channel. This style of dredge is adapted to the excavation of large channels, varying from 12 to 40 feet wide, and as deep as required. It has been used extensively in the widdle west. The ditch has a shape similar to the letter U.

A second type of steam dredge will make ditches 4 feet at the bottom, 12 to 15 feet at the top, with a depth of from 4 to 9 feet and a slope of 45 degrees. This machine is placed at the outlet and pulled up grade by means of a drum and cable. No water is required in the ditch in order to operate it. It is limited in its field and not much in favor with contractors.

The third type of steam machine has similar limitations. It is constructed to move up grade on the surface of the ground in advance of the excavation. The plant carrying the machinery rests upon long runners which rest upon movable rollers. The plant is moved by a cable, one end of which is attached to a winding drum at the engine, and the other to a log anchored some distance ahead of the machine, technically called a "dead man." The excavating machinery consists of two dippers which are filled by being pulled toward the machine and then dumped alternately.

The machines described have been used for fifteen or twenty years. The boats are built and the machinery mounted where the work is to be done. The machines cost not less than $5,000 each. They are operated by contractors, who provide themselves with full equipment to do the work by the cubic yard, under direction of an engineer. Contracts have been taken at 6 to 15 cents per cubic yard. The larger contracts approach the lower figure. Large areas are drained co-operatively, each farmer benefited paying a share. In most states the main canal is subject to the drainage law.

The course of ditches and streams is crooked in flat land, but artificial drainage channels may improve and straighten them. Ditches on rolling land may differ from those on flat lands by having narrow bottoms, since the velocity of flow is sufficient to scour and deepen them. The outlets of tile in rolling land may be shallower when there is a marked rise in the ground surface above the outlet.

CROSS-SECTION AND BEHAVIOR OF DITCHES

It has been found by experience that ditches may be constructed with sides more nearly vertical than was formerly thought practicable. In stiff loams and clays it is not desirable to cut sides with slopes greater than 1-1. Loams, 1½-1. Ditches made with a floating dredge have a slope of about 1½-1. Weathering and erosion will in any case change the slope, so it is of greater importance to secure ample bottom width in order to allow this change than to attempt to make the exact slope desired and to expect it to remain.

The excavated earth, or waste bank, which lies in unsightly masses along the edge of the ditch will, in a year or so, assume a more workable shape and can be levelled down with the plow and scraper, until the land can be cultivated nearly to the edge of the ditch. It is always well, however, to keep a strip on each side bordering the ditch in grass, to prevent crumbling of the banks and loss of soil from the adjoining field. The space between the waste bank and the ditch is called the borm, and should equal the depth of the ditch. Water will flow with a fall of six inches to the mile, but to be effective the fall of a ditch should be from 4 to 6 feet. Large and deep ditches made straight and so constructed that they will not receive silt or debris in large quantities will probably be self-cleaning. Are necessary for large areas, and should be from 6 to 10 feet deep.

In many cases the entire grade for lateral drainage must be made by additional depth of the outlet. The velocity and carrying capacity of the ditch increases with the depth. Water 8 feet deep will have twice the velocity of that 1 foot deep for the same width of ditch. This partly explains why shallow ditches make poor drainage outlets.

CAPACITY

The capacity depends on the area to be drained, the slope of the land and the fall obtainable. See text for tables.

VELOCITY OF DISCHARGE

This is modified by the fall and a number of other factors. A poor ditch with a rough bottom and irregular sides will carry only about half as much as a smooth, cement-lined canal. Grass and weeds will decrease the capacity to about one-fourth. The form of ditch is very important.

WETTED PERIMETER

The sides and bottom of the ditch touched by the water are known as the wetted perimeter. Friction varies directly with this factor. The wetted perimeter should be as small as possible in comparison with the cross-section.

DISADVANTAGES

Open surface drains have several disadvantages as deep soil drains.

1. They are seldom of sufficient depth.
2. They are apt to have a small carrying capacity, due to their uneven grade and rough bottom and sides.
3. They are expensive to maintain.
4. They waste much land.
5. They greatly interfere with cultural operations.
6. They may be subject to serious erosion.

COVERED OR UNDERDRAINAGE

B. This is the only complete form of drainage. Underdrains or any underground channels are constructed for the removal of water. Many kinds of materials have been used for this purpose, but in recent years they have been almost entirely supplanted by tile. Brush, stones, boards and bricks were formerly used. Underdrainage will improve the soil wherever there is not complete natural drainage.

TILE

Tile is best for underdrainage because it is the cheapest, the most durable, the easiest to lay, and finally because it will drain the soil most quickly. Box drains will last from ten to twelve years. In draining the land with red tile use well burnt cylindrical tile. These tiles, 1 or 2 feet long, are laid through the soil in one continuous line with such a grade that all water which finds its way into them will be carried by gravity to the lower end of the line, thus carrying the surplus away. The water enters the openings at the ends, or joints as they are called. The ends of the tile are placed close together in order to prevent the soil from entering, yet not too close as to prevent the water from entering. The action of the tile drain in removing the surplus water from the soil is as follows:

The drain being surrounded with soil, the spaces of which are filled with water, the water in the soil flows by gravity through the crevices in the ends of the tile and passes off more or less rapidly, according to the grade with which the tile is laid. Other water of the soil takes the place of that removed by percolation. Water moves downward and laterally toward the drain, and the lateral distance through which the drain will relieve the soil of water is governed by the resistance which the soil particles offer to the flow of water among them. This process does not leave the soil without moisture, but simply removes the excess or free water and makes more room for the storage of capillary or useable water. It does not remove the free water from points below the level of the drain. The free water removed by tile drains may come from rain, or it may come from seepage.

KINDS OF TILE

1. Red tile.
2. Vitrified.
3. Cement—except the very large ones is more expensive than the red clay tile. It becomes harder as it ages, and is more durable.

The tile should be round in form, straight, and every particle of clay used in making them should be completely burned. Such a tile will last indefinitely in earth and water. Where exposed to long-continued freezing and thawing, as at the outlet, the best vitrified tile should be used. After one has become familiar with the product of a given factory, properly burned tiles may be readily distinguished by their color and by their ring when struck with a piece of steel. Good clay may be semi-vitrified by skilful burning. Porosity of the finished tile is not important, since the per cent. of water that passes through the walls of the tile is very small. Vitrification is desirable.

SYSTEMS OF DRAINAGE

Mains, sub-mains, laterals.

Single, double, natural, grouping, gridiron, parallel.

The natural and grouping systems are used where the aim is not to secure perfect drainage, but rather so nearly sufficient for ordinary crops as to make the increase in yield pay a fair return for the money invested. They can be used to remove water that has collected in low places.

Compare the amount of double draining with the gridiron system and parallel system. The latter has the advantage here, but long parallel lines will require large tile, or else many junctions. The parallel system is generally the best.

DEPTH, FREQUENCY AND SIZE OF TILE

Principles of Drainage.—In general we should drain the land where the water collects.

1. Lay the mains in the line of natural drainage, except where a "cut-off" will be in line of economy.
2. Lay the laterals in the line of greatest slope, otherwise the water may ooze out of the tile in the upper part of its course.
3. Use long parallel laterals in place of short ones where possible.
4. Make the lines straight and with easy curves—easy to lay.
5. Bring all the land needing drainage under the influence of the drains.
6. Use the level wherever in doubt.

In addition to this, keep the water spread out. Small tile are cheaper.

Depth, Frequency and Size of Tile.—These three factors are closely related and constitute the most important part of drainage. These factors will depend on—

1. The character of the soil and subsoil.

2. The amount and distribution of rainfall.
3. The topography of the surface.
4. The crop to be grown.
5. Prevalence of underground water.
6. Level of the ground water.

The system should always be arranged with reference to these conditions.

Depth.—The depth must be such that water can get to the tile before it shall have caused serious injury to the crop. The drain should be near the water to be removed, and below the bulk of the roots. This necessitates that it be shallower in clay to work properly. In coarse texture soils the drains attain their full efficiency almost at once, but in dense clay there is an increasing efficiency as the soil becomes granulated and the system is established. Some silt is washed out through the tile, and tiny streamlets are formed leading to the joints of the tile. A dense clay holds its pores almost full of capillary water, which is not subject to percolation. With this condition the drain must be near the surface and function chiefly as a surface drain. Deeper drains are necessary in orchards, irrigated fields, and all deep rooting crops. In general, it is not desirable to lower the water table as far in sand as in clay, because there is less capillary action in the former. Place tile on the boundary of sand and clay if this is from 2 to 4 feet below the surface. This allows the water to move to the tile through the sand. Generally 3 to 5 feet will be sufficient depth, and 3½ is the common depth. The rule in the reclamation service in draining alkali land is to never place the tile more than 4 feet below the surface.

Frequency or Distance Apart.—The distance apart is closely related to the depth. It also depends on the texture of the soil and the amount and rate of the removal of rains.

1. Relation of Depth and Distance Apart.—If tile placed 3 feet deep and 100 feet apart lowers the water table 1 foot from the surface at the highest point, then placing tile 4 feet deep will lower the water table half-way between them, 2 feet below the surface. We could accomplish the same thing by placing the tile 50 feet apart and 3 feet deep. If we put the tile deeper it will draw the water further each way, and the tile can be laid less frequently.

2. The Amount of Rain and the Time Allowed for Removing it.—Water moves through clay very slowly, and if a large amount is to be removed in a short time the drains will necessarily be placed close to the surface, and at frequent intervals their function will be primarily as surface drains.

3. Influence of Soil Texture.—In clay the interval must be much less than in sand. King found that 48 hours after a heavy rain the water table was 1 foot higher in clay soils at a distance of 27 feet from the drain. In sand the grade was 1 foot in 175 feet. Then to remove the water table to within 1 foot of the drains in clay, the tile lines would be placed every 54 feet, while in sand the distance would be 350 feet. This is probably the extreme, and the tile would need to be larger with this greater distance. Impermeable soil will require frequent parallel drains where level. Use the regular, thorough system of drains where level, uniform soil is to be drained. The aim should be to reduce the water table a definite distance in a reasonable time after rains, and the drains must be sufficiently frequent to accomplish this.

The natural system removes water where it has accumulated in low places. Large areas are drained by single lines of tile. The tile follows the natural water course, or is placed so as to intercept the seepage. This will do where the aim is to secure only fairly perfect drainage, so nearly sufficient for ordinary crops that the increased returns will pay a fair return for the outlay.

Where in doubt, one could adopt the minimum interval and place the first lines of tile at two or more times this interval. If necessary, other lines could be placed between these at a later date.

Experience with different soil conditions has given us a fairly definite distance for placing tile in given soils:

100 ft. to 90 ft. apart for sandy soils.
60 ft. to 75 ft. apart for loam soils.
50 ft. to 60 ft. apart for sandy loam.
40 ft. to 50 ft. apart for loam.
35 ft. to 40 ft. apart for heavy loam.

30 ft. to 40 ft. apart for heavy clay.
30 ft. apart for soils high in iron and clay.

Size.—The size of the tile depends on:

1. The amount of rain.
2. The rate of removal.
3. The amount of surface run-off.
4. The grade.
5. The soil.
6. The area drained.

There are times when the crop has taken the moisture out of the ground so that a 2 in. rain will not start the tile. At other times it may be necessary to remove a large part of the rain in 48 hours. At times the water cannot pass through the soil fast enough, even though the tiles are large enough to carry it off, so that part will need to be removed over the surface.

The total rainfall in different sections varies materially. Drainage has to deal with extremes of rainfall rather than the mean. Laboratory experiments are so different from field conditions that our best deductions come from the working of drains in land of a known character. Generally, if the main drains have the capacity to remove one-half inch in depth of water from the entire tract in 24 hours, they afford what may be regarded as good farm drainage. This is the capacity of many good systems in alluvial soils. In places where no advantages can be taken of surface flow, mains may be arranged to carry away 1 inch of water in 24 hours.

Where several laterals empty into a main, the latter must have a capacity nearly equal to their combined flow; but it is not possible to calculate the total or relative sizes with the exactness which is possible with a pressure system of pipes. This is due to the effect of the soil, which acts as a sponge, and gives up its water gradually and to the eddies caused by joints. The greater the fall the greater the capacity.

The area of a cross-section of a tile increases in ratio of the squares of the diameters. Thus 2, 3, 4 and 5 feet tile have cross-sectional areas with a ratio of 4, 9, 16 and 25 square inches. Friction and eddies are less in large tile, so that doubling the size of tile makes the capacity more than four times as great. Longer length of tile gives less capacity, due to increased friction. In general, a 4-inch tile will drain about five acres, and should not be over 500 or 600 feet long. A 5-inch tile will drain 10 acres; 6-inch, 20 acres; 7-inch, 40 acres; 8-inch, 60 acres.

DIRECT LEVELLING

The first working principle in drainage is the finding of the differences in level of two or more points.

A level surface is one that is parallel to the surface of standing water. A water surface is not level theoretically, due to the curvature of the earth's surface. It is assumed to be level, and perpendicular to a vertical line or the line of gravity. Thus a true level line is a curved line whose points are all equidistant from the earth's centre, and is apparently level.

A point is above or below another point according as it is a greater or less distance from the earth's centre. This difference is called "difference of level" of two points. The height of a point is its distance above a given surface, measured on a vertical line, and is called its elevation.

Direct levelling depends on three principles:

1. That the surface of a liquid in repose is level.
2. That a vertical line is perpendicular to that surface.
3. A bubble of air confined in a vessel otherwise filled with liquid will rise to the highest point in that liquid.

In direct levelling two instruments are necessary. (1) The "Y" level, which is an instrument that can be adjusted so as to mark out a horizontal place in any direction from a given point. (2) A levelling rod, an instrument that can be used to measure vertical distances. As accessories to the work, we need a tape line, or chain, for measuring distances, and a set of eleven pins for marking points; also some flags.

Parts of the level.

1. An erecting telescope to show the image in its erect or natural position, resting on Y-shaped supports—(a)

Object glass. (b) Eyeglass. (c) Cross hairs.

2. Level or bubble tube; is of glass, bent upward.
3. Y's.
4. Level bar.
5. Tripod socket.
6. Tripod.

Level Adjustments.—To adjust the instrument requires great care on the part of the man handling it, lest the screws be set too hard or too close. All instruments are sent out in perfect adjustment and ready for use, and their adjustment should not be interfered with until it has been positively ascertained that it requires correcting. Ordinarily but two adjustments will be required:

1. Level up by means of the opposite pairs of thumb screws, to adjust the several parts of the instrument to one another. Always turn the two opposite screws at the same time, as though they were cog wheels and locked into each other. Never allow them to become tightly set.

2. Adjustment of the instrument to the object under observation. (These are the only adjustments to be made by the student. If the instrument is found to be out of adjustment, report the fact to the instructor at once.)

1. Adjustments Which May Be Required.—Adjustment within the telescope (eyepiece, cross hairs, etc.). Mount the instrument on its tripod, and point the telescope at some light-colored object. Gradually pull (draw) the eyepiece until the hairs appear clear, sharp and black. Then point the telescope at some well-defined object and bring that into focus (distinct vision) by turning the focusing screw, which moves the object glass in or out. (Move in for long range.) When the object is in focus the cross hairs should cross at the centre of the field, and should appear sharp on the well-defined object. They should not appear to change their position when the eye is moved slightly about at the eyepiece. If the cross hairs appear to move or change position, the following adjustment may be required:

Turn the telescope over one pair of levelling screws, sight the cross hairs in some sharply-defined point, not less than 200 feet away, rotate the telescope halfway around, and note the position of one of the cross hairs in reference to the point intersected by them. If this deviates during rotation, correct one-half the error by means of that pair of capstan head screws which is at right-angles to the cross hairs under observation. Loosen one screw before tightening its opposite screw. (These screws shift the ring which carries the cross hairs.) The other half of the deviation is corrected by the levelling screws, slacking one and tightening the other equally and at the same time. Repeat this until the hair revolves correctly, then proceed in the same way with the other cross hair. Should both cross hairs be badly out, adjust them gradually and alternately, rather than adjust one completely before starting to regulate the other. When regulated the hairs should intersect in the middle of the field, which is visible through the eyepiece.

2. To Adjust the Level Vival.—It must be brought into line with the line of sight of the telescope. (Must not deviate up, down, or sidewise.) To adjust to the horizontal (up and down) clamp the bar over one pair of levelling screws, then turn the telescope end for end. If the bubble departs from the centre, correct one-half the error by raising or lowering one end of the level by means of the capstan screws. Correct the other half of the error by means of the levelling screws, and repeat till the telescope can be reversed without shifting the bubble. The other screw affords adjustment sidewise.

3. To Make the Cross Hairs Vertical Without Disturbing Other Adjustments.—Place the telescope in its "Y's," close the clips, and rotate the telescope in the Y's until the pin on the collar of the telescope stops against the pin on the clip. Focus the vertical cross hair on a plumb line at a distance of 100 feet. If the cross hair does not exactly cover the plumb line, correct it by shifting the capstan head screws.

Sometimes the cross hairs and eyepiece require regulating after all other adjustments have been made.

The Use and Care of the Level.—Avoid using the level in rainy weather.

Moisture obscures the lens and injures the instrument. If rain is unavoidable, wipe with a soft linen cloth and then dry with a chamois in a warm place, until every particle of moisture is removed. Carry the level without clamping the spindle. It will be less rigid and less easily injured. Carry the level in front of you in going through a door. In going over a fence place the level on the other side first, spreading the legs apart to make it stand. In windy weather set it firmly on its legs.

Target Rods.—These are used to measure vertical distances, and are of two classes:

1. Self-reading or speaking rod.
2. Not self-reading. (Explain).
   (a) Extension rod

Always check readings. The extra man in the squad should go with rodman so as to get extra check on readings. (Demonstrate—showing level.)

DEFINITIONS

A datum line is the base line to which the elevation of every point of a series is referred.

Benchmarks are permanent objects whose elevations are determined and recorded for future reference.

Turning points are points where the bearing of the line changes, and these are marked by placing a pin in the hub stake used at this point.

Backsights are readings on points whose elevations are known. A backsight is taken for the purpose of obtaining a new height of instrument. Backsights are plus quantities and are to be added.

Foresights are readings on stations whose elevation is to be found. Foresights are minus quantities and are to be subtracted from the height of the sight line. This gives the elevation of the station road.

How to Keep Level Notes and Records.—Subtract the foresights from the height of the instrument to get elevations, and add backsights to the elevation of stations to get new height of instrument.

The field book is divided into six columns on the left page and two on the right page, and should be headed as follows:

Sta. B.S. H.I. Elev. Grade. Cut. Remarks
BM
1
2
3
etc.

Proof.—The sum of the backsights minus the sum of the foresights equals the difference in elevation.

Grade line is the line along which the water in the drain is to flow. (Explain uniform grade, change of grade.)

Cut is the difference between the elevation and grade at each point.

Remarks.—Under this note the name of the levelman, point taken for benchmark, sketch of drains, points at which laterals join, etc.

LAYING OUT A DRAINAGE SYSTEM—RECORDS

The first thing in laying out a drainage system is to tramp over the land to be drained and find out the lay of the land and then set up some flagpoles. Just a straight stick with a cloth on top will do, if you do not have regular surveyor's poles. These are placed so that the chainman can chain the levels.

A Preliminary Survey.—It may be exact or it may be taken roughly. It may be necessary to make a topographic map of the whole area to be drained. In this sort of a map put in streams, etc. After this should decide on some definite plan. Decide on some bench mark. Then go ahead and take your level notes from which you could figure your total available fall. Should chain all the lengths in order to know accurately how much tile you will need. Then make a statement and put down how may 8 in., 6 in., 4 in. and 3 in., and then total up and see how much it will cost.

Contour Maps, Relief Maps.—A contour line is simply a line connecting all points of equal elevation. To make a contour map take the elevation of every certain distance, say 100 feet. This distance is regulated by the topography of the land to be drained. Sometimes make a topographical map and then below make a relief map. Every farm subject to drainage or irrigation needs to be provided with a contour map. Such a map will show the proper location of drains or irrigation ditches.

Profile Maps.—These show a cross section of the strata through which the line of tile is to pass. They will show you the depth to be dug at each station. In preparing profile maps use a scale of 4 feet to the inch vertically, and 100 feet to the inch horizontally. The tile line should be in red ink.

Permanent Map.—Plane table. The permanent map should be accurate, so that in after-years it would be possible to go out in the field and locate the drainage system or any part of it immediately.

Details of Drainage.—The bearing of the line is the angle which it makes with the magnetic needle.

Length of Laterals.—This should not exceed 800 or 1,000 feet for 3-inch tile and may be 2,500 feet for 6-inch tile.

Amount of Fall.—Fall is the common term for slope of land or for total head when applied to drains.

Available fall is the fall that can be given to a drain in a prescribed distance, and may be greater than the fall of the surface.

Grade of a drain is the rate of fall expressed in decimals of 1 foot per 100 feet. A uniform grade is simplest, but it is often necessary to change the grade. When this is done it is best to change from a less to a greater grade. A change from a greater to a less fall would check the velocity and cause silting of the drain. If it is necessary to change the grade, it is a good plan to use a silt basin.

Silt Basins.—Silt basins are small cisterns in the drain extending to the surface and affording a means of cleaning out the silt. They help to collect flood water quickly. They prevent the drain from being clogged and becoming silty. They may afford watering places for stock. In a small drain a large 12-in. tile may be used by standing on end. Larger basins may be used made of brick, or boxed up with wood, and should be 3 feet in diameter, so that a man can enter and clean out the silt.

Collars.—The use of collars is obsolete. Gravel or straw may be used in heavy soils where convenient, to allow water to enter tile more readily. The big problem in our white land is to get the water into the tile, as it does not draw well, so sometimes they put in gravel. This will help for several years, but in a volcanic ash soil or in our heavy soils it will become silty.

Junctions.—Laterals should enter the main at an angle of 45 degrees, and with a slight fall. It is then less likely to clog up, and is not so likely to back up and become silty. Sometimes the drop will only be one-tenth of a foot, sometimes more.

Sinks.—They are useful in ponds where there is a layer of hard clay underlaid with sand. They are made by simply digging a small well (probably 3 feet in diameter and 12 feet deep) down through the clay to the sand to let the water through. Sometimes this is all the drainage that is necessary.

Surface Vents.—They may be on the order of silt basins or catch basins. Surface vents are used to catch surface water. Surface vents are also used to afford ventilation in close soils.

Outlets.—Outlets are very important. It is necessary to have a good outlet. Where the outlet is submerged and the velocity of the outflow is chocked, sediment is apt to collect and clog the drain. The water should have a free spillway at the outlet. Vitrified tile, wood or masonry should be used at the outlet where the drain is exposed to frost.

Obstructions.—The principal obstructions to tile are: 1. Small animals. 2. Roots. 3. Silt. The outlets should be protected with screens to keep out small animals. A good screen is made by a ¼-inch iron rod set 1 inch apart. The roots of such trees as willow, elm, larch, tamarack and soft maple are troublesome. Also alfalfa and grapevine roots. Trees within 15 or 20 feet of the drain should be girdled or cut down. Silt will be less troublesome in large tile. Small tile must be laid true to grade to prevent trouble. To locate obstructions dig holes in several places over the tile. When below the obstruction we find the water will fall away into the tile; above the obstruction it will stand in the hole.

DIGGING, LAYING TO GRADE AND COVERING

Ditching Tools: Their Uses.—Tile spading for removing the first spading is 18 inches long, concave, with a square cutting end. It is important that the ditch be started properly, so that the sides are plumb and smooth. The beginner makes harder work and less progress by cutting the spadeful too thick. Cut 1 inch and dovetail at centre. A 3 feet ditch should be started about 9 inches wide. The common round-pointed shovel may be used to remove crumbs from the bottom of first spading. Leave crumbs till last in dry weather. The second spading is removed by use of a spade about 16 inches or less in length, concave with rounded cutting edge. The second spading should go to within 1 inch of the grade line. Crumbers are used to remove crumbs from the last spading and bring the ditch to grade. They are concave, semi-cylindrical, with rounded cutting blade at either end. The handle may be set at any angle. Can get 3-inch or 6-inch size. Man with crumber should keep near the one who is laying the tile.

Tile Hooks.—Tile hooks are used for smaller sizes of tile, and are a great aid to rapid work where the tiles are cylindrical and the ditch is carefully prepared. A good hook should be less than a right angle, and may be made by running a 10-inch bolt through a pole about 2 inches from the larger end. The pole should be a little larger than a rake handle, and the end may be used to tap the tile firmly into place.

Laying to Grade.—This may be done by use of a line, by use of targets, or by use of line and frequent cross lines.

Difficulties.—Quicksand—caving in.

Laying Tile.—In laying tile take advantage of imperfections in tile and make them fit the joints tightly. Keep true to grade and in a straight line or use easy curves. Silt basins. Outlets. Junctions.

Covering.—As soon as it is inspected, blind tile. The ditch may be filled with a plow, using long double tree where no crop is growing. Plow may be used to open ditch where it will not interfere with crops or surveyor's stakes.

DITCHING MACHINES

Home-made Level.—It may be made of gas pipe, turned up at the ends. (See King). Carpenter's level. (See Irrigation of Alfalfa).

Contracts.—1. Must start at outlet. 2. Grade true. 3. Lay from outlet. 4. Blind. 5. Risk. 6. Tile furnished by owner. 7. Diligence. 8. Pay 75 per cent. 9. Tools by contractors.

DRAINAGE OF FARMYARDS, BUILDINGS AND ROADS—SEPTIC TANK

Road Drainage.—Drainage is the foundation of good road construction. The surface must be crowned. Use frequent culverts and passages to fields and avoid letting the water accumulate so that it has much erosive power. Use "water breaks" on hills to throw water to side of road. Keep the surface smooth and with a 1 to 20 slope to the exact peak of the road, not rounded. Side ditches should have flaring sides. 1 to 18 slope on side of hills. Protect the side of the ditch from erosion by paving the bottom with stone or brick.

Sub-drainage.—A good road must be thoroughly drained, and artificial drainage should be provided in low, wet places. Get rid of the water in the foundation of the road before frost. Three-inch tile with a fall of 3-10ths of a foot per 100 feet—cross drains.

Barnyards, Buildings, Etc.—There should be a ditch around the farmyard to shut out any water that might run in from the outside. Have the feed floor slope gradually to a catch basin and carry the water below. Water from eaves should also be collected and carried to a catch basin. This basin should be large enough to check the water and allow the silt to settle. The inlet must be protected by wire grating. Drain around all basements.

Septic Tank.—Waste from farmhouse and from the other buildings can best be handled by means of a sanitary septic tank. The tank in the accompanying cut is 3x5x6½ feet, and is large enough for a farm or for ten or eleven persons. The first chamber is 3x3 feet, or one-third larger. The partition is 6½ inches thick. The first 12 inches is of concrete, then 18 inches of vitrified brick, laid dry without mortar and leaving ¼ inch between the ends. Above the brick is 15 inches more of concrete. The outer wall is 6 inches thick and plastered inside. The inlet must turn down and discharge below the surface of the liquid. The solid free liquid passes through the partition between the bricks and syphons out once in 24 hours. The outlet rises from near the bottom of the tank and leads to 50 feet of 3 inch tile. The liquid as it passes out is free from disease germs, and it percolates away from tile to soil.

In close ground it may be well to put a load of gravel along in the trench before laying the tile. The capacity required per person is about 4 cubic feet. The tank need not be more than 20 feet from the house. Sewage contains about two parts per thousand solids. One of those two parts is mineral matter, the other organic matter. The mineral matter will not dissolve or decompose, and so a manhole is provided at the top for cleaning out about once a year. The liquid leaving the tank should be almost odorless, but in order for this to be so there must be no strong currents in the tank. The inlet should have but a moderate fall, 1 inch per rod. In cleaning out, do not remove the scum, as this contains the ferments, causing decomposition of the sewage.

Materials for the Septic Tank.—Gravel, 2½ yards; sand, ½ cubic yard; cement, 3½ bbls.; lumber for form; tile at outlet, 50 feet; vitrified brick, 60; sewer tiles; labor.

The cost complete is $30 to $35.

SPECIAL DRAINAGE PROBLEMS

Muck Lands.—These lands part with their moisture easily, and may become too dry. They settle when drained. Open ditches 4 feet deep and 200 feet apart, or tile drains 150 feet apart will in general be about right. Because those soils part with their moisture readily they may be drained very successfully. Frequently cranberry marshes will not need to be thoroughly drained, but drained part of the year.

Drains to Prevent Erosion.—This is frequently a special problem. On hill sides use open ditches of moderate fall, or underground tile lines. Plow the ground so as to have terraces running around the mound and check the run-off.

Salt Marshes.—These are problems that need special attention. To drain salt marshes dike the tides out and then collect the water in surface ditches. This will generally require an engineer. Select land that is close to a market. Should be governed by the location of the land, its nearness to market, as to whether it will pay to drain. Locate the dykes so that the drains will discharge at low-tide. These dykes should be high, strong and wide, and provided with tide gates. Then the drainage area should have main drain and laterals leading to it. The rains and drains should remove the excessive salt in a couple of years, during which time the land may be pastured. Sorghum or rye may be used for the first crop. Cost of draining such lands will be about $30-$60.

Around Astoria considerable of the dyking is done by hand labor. The labor costs about $6.50 per rod. The dykes are built 6 feet above the water and have a top width of from 6 to 8 feet and can be used for roads.

River and Creek Bottom.—Straighten the stream, dyke the upper part of the flat lands necessary, clear the river channel of brush, deepen it if necessary, clear the land of organic matter where the dyke is to be built. The slope of the side walls will depend on the character of the soil. They ought to be 3 feet above the high-water mark. They are ordinarily 6 or 8 feet wide on the top. Sluice gates are necessary so that you can let the water out when necessary.

Drainage of Irrigated Lands.—About 13 per cent. of all the irrigated land in the United States, or about one million acres, is in need of drainage. The reason for this is the excessive use of irrigated water. The first appearance of excessive water is the appearance of swails and swamps, and later on white and black alkali, brought to the surface. The water table rises, and when it reaches to within several feet of the surface the alkali or soluble salts rise to the surface, the water evaporates, and leaves this deposit of salt.

Remedy.—The best remedy is to drain the land. Lower the water table to about 4 or 5 feet below the surface. The seepage from above should be intercepted and removed by a deep cut-off ditch. Use a second ditch if necessary, and then tile below as needed. The size of the drain depends on the area above. It may be necessary to line the canal in places where the soil is gravelly.

Kind of Drain.—It should be 4 to 7 feet deep and may be open ditch. Box drains are often better than tile. Use the larger size, never less than 5 inches. Box drains should never be less than 6x6 inches, while 10x12 or 12x20 inches is often used. Tramp the dirt back into the trench and watch surface irrigation water to prevent it from entering the tile.

Obstructions are more frequent in irrigated land. Alfalfa roots have been cleaned out by dragging brush and wire through. Should leave a manhole to the tile every 500 feet.

Arid soils are not full of water crevices and water moves in special underground passages. In planning for a drainage system, the first thing is to study underground conditions and lay drains to the water.

COST OF DRAINAGE

First of all, we must know the number and size of tile required before we can make any definite estimate.

Items of Expense.—Elliott.

1. No. of Tile.—Lay direct to source of water and use no more than is necessary.

2. Cost of Tile.—3 inch, $16 per 1,000; 4 inch, $20 per 1,000; 5 inch, $30 per 1,000; 6 inch, $40 per 1,000; 8 inch, $60 per 1,000. (Of course, the price of tile will vary at times and in different localities. The prices given above are for the local market.)

3. Freight if Shipped.—3 inch tile weighs 4½ lbs.; 6 inch tile weighs 11 lbs. The cost of freighting tile is about 10c per 100 lbs. This is for small quantities.

4. Hauling and Distributing.—3 inch tile will run about 400 to the load, and 6 inch tile about 175 to the load. Cost about $5 to teams.

5. Digging and Laying.—$2.50 to $3.50. Considerable tile has been laid in this vicinity for 40-60c per rod. This includes filling the ditch.

6. Laying out and superintending, 5 per cent.

Tile required per acre if laid parallel and 50 feet apart will be 872 feet. Calculate the cost of such thorough drainage per acre of 4 inch tile.

BENEFITS

1. Cause Firmness and Fineness of the Soil.—The excess of water recedes from the surface and takes its place lower in the soil, soon leaving a firm surface, which can be passed over by teams or live stock without injuring the texture. The fineness of the soil is increased by percolation.

2. Permits Earlier and More Timely Cultivation.—The water from rains and thawing ice passes down through the soil, admitting warm air and rains, so that the surface is ready for early plants much sooner than wet soils.

3. Produces Aeration of Soil.—The interspaces of soil becoming relieved of water are filled with air which carries fertilizing gases and furnishes oxygen to the roots of the plants and for the support of soil bacteria.

4. Increases the Temperature of the Soil.—This is explained in King's book on "The Soil." If we allow the surplus water to drain away from the field rapidly, rather than to hold it there until it has time to evaporate, it will greatly favor the warming of the soil.

5. Prevents a large waste of fertility by surface washing.

6. Increases the depth of the soil.

APPROXIMATE PRICES AND WEIGHTS OF TILE

Size in inches	Price per 1,000 feet	Weight per ft. in lbs.	Average car-load in feet	No. of feet per ton
3	$ 16	4½	7,500	400
4	20	6½	6,500	334
5	30	9	5,000	250
6	40	11½	4,000	182
7	50	14	3,000	143
8	60	18	2,400	111
10	90	25	1,600	80
12	120	33	1,000	60
14	150	43	800	56
16	190 220	62	500	36
18	265-300	80	400	27
24	450-526	120	300	18

British Columbia Egg-laying Contest

THE egg-laying competition inaugurated by the Vancouver Exhibition Association and now conducted by the B. C. Poultry Association, under the supervision of the Provincial Government, was formally opened on October 20 at Hastings Park, Vancouver. The competition is the first one of its kind to be held on the American continent to extend over a period of one year. It will close on Octoboer 19, 1912. Similar competitions to start on this continent shortly are the North American, opening on November 1, and the Mountain Grove, Mo., also on that date. The local association is giving double the prize money offered in the other cities, while the entrance fee is only one-fifth. The prize money totals $360, in addition to special prizes to be solicited, to be allocated by the committee under the jurisdiction of which this competition is directly being held. The B. C. Poultry Association is contributing $100 to the prize money, similar amounts being donated by the Vancouver Exhibition Board and the Provincial Government.

The officers appointed in connection with this contest are: Patron, Hon. Martin Burrell, M.P., Minister of Agriculture of the Dominion; honorary president, Hon. Price Ellison, M.P.P., Minister of Agriculture of British Columbia; honorary vice-president, Mr. J. J. Miller, president of the Vancouver Exhibition Association; contest committee, Messrs. T. Edwards, Victoria, and W. Stonehouse and M. A. Jull, Vancouver, representing the B. C. Poultry Association; H. S. Rolston, representing the Vancouver Exhibition Association; J. R. Terry, Victoria; W. E. Scott, Deputy Minister of Agriculture, representing the Provincial Government.

The competition is regarded as an asset both from commercial and educational standpoints. At present there are 37 pens, each containing six birds. Eighteen additional hens are expected, which will mean that there will be 40 pens, with a total of 240 birds. Five of the pens are contributed by Australia and New Zealand, which are represented by three and two respectively. Three pens have been received from Vancouver Island, two from Ontario, and one from England. The other pens contain fowls from different parts of British Columbia—Revelstoke, Vernon, Arrow Lake, the Fraser Valley and Kamloops being represented. In order to compete here the Australian birds were hatched in the fall.

All of the lightweight class consists of Leghorns, white, buff and brown. There are eight varieties in the heavyweight class: Barred, Buff, Rocks, Columbian, Partridge, Silver-pencilled, Silver-laced and White Wyandottes, Rhode Island Reds and Buff Orpingtons. The most numerous in the heavyweight class are those of the Wyandotte variety. All birds were hatched in 1911.

It fell to the honor of Mr. J. J. Miller to declare the opening of the competition. At the outset he apologized for the absence of Alderman Stevens, M.P., who was to have performed the ceremony. Mr. Miller said he was interested some years ago in similar competitions in Australia, a country which was giving much practical encouragement to poultry-raising. The poultry industry needed much support in British Columbia, and he believed the present competition would serve to stimulate a great interest among people who would take up the development work. The competition would mean that it would settle the question of the best class of hens to keep in the province. There was a scarcity in the supply of eggs and poultry in British Columbia. They were all indebted to Mr. Rolston, the manager of the Exhibition Association, and also to the association for taking the matter up and gaining the support of the Provincial Government.

The speaker then dwelt with several projects which the Exhibition Board has under consideration. He said it was the intention of the board to encourage horticulture in home life, and that competitions would shortly be held for the best kitchen gardens. The board's support of agriculture was also dealt with, and he expressed the hope that there would, at an early date, be located an aquarium and mineral and agricultural museums in Hastings Park. In conclusion, he spoke of the need of the citizens supporting the exhibition which stood not only for the best interests of Vancouver, but for the province at large. "I have now much pleasure in declaring the competition open," he remarked amid applause.

Mr. E. B. Cale, the president of the B. C. Poultry Association, said that the thanks of the poultrymen were due to the president and manager and also the directors of the Vancouver Exhibition Association for bringing the scheme to a head.

Alderman Kirkpatrick, while pleading not guilty to being a poultry expert, wished the competition all success.

Mr. W. E. Flumerfelt, school trustee, said he was deeply interested in all kinds of education, but this was a new department for him. He hoped the movement would prove all expected of it.

Mr. M. A. Jull, B.Sc., formerly live stock inspector employed by the Provincial Government, paid a tribute to the Vancouver Exhibition Board and also to Mr. Terry, stating that the contest was an initial move for the greater development of a profitable industry in the province. Mr. H. S. Rolston gave a short speech extolling the work in question. He was glad to have lent his assistance to such a laudable scheme.

Mr. J. R. Terry, the Provincial Poultry Instructor, said that the contest was being held to determine which were the best strains. Unfortunately, some competitors had sent in birds which had been hatched too early, but taken all round, the aggregation was one of which the province could be justly proud. In a competition held eight years ago in Australia the birds laid 130 eggs. The birds in such competitions in the land of the Southern Cross now laid 182 eggs, which clearly showed what the promotion of such contests meant. He believed that in the competition at Hastings Park the birds would have an average of about 150 each, which would indeed be creditable. Providing an aggregate on this average, it would mean a supply of 36,000 eggs. Some of the birds in the contest were worth as much as $20 each.

He claimed that there were 75,000 dozen eggs shipped into Vancouver every week from Ontario, Nebraska, Oregon and other centres. Last year British Columbia sent out of the province over $2,000,000 for eggs and poultry obtained from foreign sources. This clearly showed the need for the development of the industry here. Full detailed reports concerning the progress of the competition would be published in the press every month.

He did not believe that the present contest would come up to the showing in Australia, where there was an average of 259 eggs per bird. This was more than could possibly be expected at the first attempt. However, British Columbia had the finest climate in the world for chicken-raising, and he predicted that the industry would flourish in this province at no distant date.

Mr. William Clements, of Clarkson, Ontario, made a eulogistic reference to the opening of the competition and referred to the spirit of western progressiveness, remarking that Vancouver was the most beautiful city he had ever had the pleasure of visiting. Mr. T. J. Smith, director of the Exhibition Association, Mr. W. Stonehouse and Mr. James Smith also spoke.

SCIENCE IN AGRICULTURE

JUST what science has to give practical agriculture, what it will do in getting results in the way of larger yields or better quality of crops, or what it will do towards raising better live stock or bringing larger returns for feed consumed, or to sum it all up, what it will do towards helping out the pay end of the farm, is a problem many farmers are pondering over now, when young men from nearly every locality have decided to take a scientific course at one or other of the colleges of agriculture that have opened, or will open, in different parts of the Dominion.

The question is not so much, Will these college graduates with a scientific training make a success of actual farm operations? as What is there in this science of agriculture and how can it be adapted and profitably put into practice on the average farm?—consisting, as the science does, of the why and the how of all agricultural, natural and chemical processes that occur upon the farm, such as how food nourishes animals, why one food gives more nourishment than another, and how one food will influence the food value of another, as a study of how plants obtain their food from the soil, why certain cultivation affects the availability of the food, as a study of the reproduction of life, of the factors that go to build up and maintain the qualities or characters in breeds of animals. But enough has been said to show that the science entails the study of the principles going to make the foundation of practical agriculture. Then all true farmers will admit it is well that some of our young men are making a minute study of one or more branches that make up this science. Through them, and them only, directly or indirectly, a general knowledge of the science must be given to the agricultural world — a knowledge sufficient to enable the active farmer to apply these scientific principles to average farm conditions with profit.

There is one point, though, we cannot overlook. Science can never take the place of the practical or commoon-sense part of farm work. A scientist may work out a perfect ration for fattening a bullock, but it remains for the practical farmer, not the scientist, to feed this steer with this ration compounded by the scientist and make the feeding a success.

So there is a part of agriculture, call it the practical side or what you may, that science cannot fill. It requires years of active work on the farm to acquire this practical education. Science can greatly supplement it to develop more fully the possibilities of the farm, but it can never supplant it. It still remains, and always will, for the practical farmer to make the farm a paying proposition. However, we must sooner or later recognize the efficiency of the scientist in agricultural problems. He has already done much for which little credit has been given. We have a habit of taking scientific discoveries as of little moment once we have begun applying them to our everyday work; but we may, by following his work through the student, or by the press, develop on the farm new sources of revenue, and close more than one leak. Experience is already showing that to the farmer who follows most closely the work of the scientist is given the greatest measure of success.—"Farmer's Advocate."

FRUIT-GROWING IN WASHINGTON

SOME idea may be gained of the extension of fruit-growing in the State of Washington, just south of British Columbia, from the following figures: Seven counties in eastern Washington have under cultivation 6,930,389 apple, 1,251,735 peach, 743,963 pear, 207,018 cherry, 182,931 prune and plum, and 94,873 apricot trees, according to reports compiled by F. A. Huntley, State Commissioner of Horticulture. Walla Walla, Stevens and Benton counties, in which the count is not yet completed, it is estimated, will bring the number of apple trees to fully 10,000,000, a full crop from which would mean about 70,000,000 boxes, or more than the total apple production in the United States in 1910.

Commissioner Huntley reports this acreage: Apples, 126,116; peaches, 11,590; pears, 6,888; cherries, 1,916; prunes and plums, 1,693; apricots, 878. The number of trees in the seven counties follows:

Yakima county, four years and older, apples, 642,032; pears, 247,222; peaches, 416,729; apricots, 6,087; plums and prunes, 18,383; cherries, 16,644. Three years and younger, apples, 1,241,739;

pears, 310,506; peaches, 226,065; apricots, 16,632; plums and prunes, 27,262; cherries, 13,989.

Spokane county, four years and older, apples, 595,076; pears, 27,333; peaches, 32,500; plums and prunes, 48,373; cherries, 46,304. Three years and younger, apples, 1,299,805; pears, 6,902; peaches, 6,704; plums and prunes, 942; cherries, 9,834.

Chelan county, four years and older trees, apples, 578,388; pears, 42,744; peaches, 122,969; apricots, 20,172; plums and prunes, 10,570; cherries, 30,134. Three years old and younger trees, apples, 1,243,193; pears, 50,622; peaches, 52,022; apricots, 20,569; plums and prunes, 4,951; cherries, 14,188.

Okanagan county, four years and older, apples, 158,667; pears, 3,675; peaches, 6,753; apricots, 1,450; plums and prunes, 5,285; cherries, 2,800. Three years and younger, apples, 689,868; pears, 12,480; peaches, 38,300; apricots, 10,413; plums and prunes, 6,486; cherries, 11,457.

Asotin county, four years and older trees, apples, 38,272; pears, 1,750; peaches, 129,742; apricots, 2,279; plums and prunes, 3,493; cherries, 39,200. Three-year-old apples and younger, 85,864; pears, 12,600; peaches, 47,783; apricots, 3,143; plums and prunes, 12,741; cherries, 1,229.

Whitman county, four years and older, apples, 106,750; pears, 1,145; peaches, 68,750; apricots, 2,880; plums and prunes, 25,550; cherries, 5,955. Three years and younger, apples, 19,544; pears, 7,313; peaches, 25,138; apricots, 3,715; plums and prunes, 14,235; cherries, 6,720.

Douglas county, four years and older trees, apples, 14,862; pears, 4,902; peaches, 4,056; apricots, 1,046; plums and prunes, 1,041; cherries, 2,106. Three years and younger, apples, 222,329; pears, 14,771; peaches, 28,242; apricots, 6,487; plums and prunes, 2,519; cherries, 6,458.

There are numerous large commercial apple orchards in Walla Walla, Stevens and Benton counties. One community project in Stevens county already has planted more than 350,000 two and three year old trees, and when completed there will be 1,250,000 trees on the 18,000 acres.

HAD WONDER COMING

A girl had gone to dinner in New York with her steady. The young man noticed a speck of what appeared to be lint on her shoulder. When she wasn't looking he attempted to knock it off with his finger. After several futile attempts he took hold of the line and started to pull it off. He unravelled several yards of the fleecy stuff and when he seemed to have it all off he threw the wad under the table. That night the girl told her mother that she had a perfectly lovely time. "But," she added, "I have just been lying there in bed, mother, and wondering what became of my union suit."

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ROBERT BURNS ON "YOUTH"

A poem recently found in one of Burns' manuscript Exercise Books

Youth is the vision of a morn
  That flies the coming day;
It is the blossom on the thorn,
  Which wild wings sweep away;
It is the image of the sky
  In glassy waters seen,
When not a cloud appears to fly
  Across the blue serene.
But, when the waves begin to roar
  And lift their foaming head,
The morning stars appear no more
  And all the heavens is fled,
'Tis fleeting as the passing rays
  Of bright electric fire
That flash about with sudden blaze
  And in that blaze expire.
It is the morning's gentle gale
  That as it swiftly blows
Scarce seems to sigh across the vale
  Or bend the blushing rose.
But soon the gathering tempests soar,
  And all the sky deform;
The gale becomes the whirlwind's roar,
  The sigh an angry storm.
For Care, and Sorrow's morbid gloom,
  And heart corroding Strife,
And Weakness, pointing to the tomb,
  Await the Noon of Life.

◆

On being asked what his cat's name was, a little boy replied:

"I used to call him Tom, but I changed it to Nellie so he'd have kittens."

Experiments in the Pollination and Setting of Fruit

THE following is a brief summary of experiments which I have conducted during the present year on the pollination and setting of fruit. To test the effect of excluding bees from strawberry blossoms, the box portion of a handlight was placed around a plant and muslin tied over the top; on other plants, single bunches of unopened flowers of several different varieties were placed in muslin bags, but in each case very little difference between the fruit of the enclosed flowers and those in the open was to be noticed; apparently the wind carries the pollen over the flower, as the ordinary strawberries in cultivation set their fruits with pollen of the same flower.

In raspberries and loganberries, enclosed in muslin bags, the fruits set, but they were not quite as large or as perfectly formed as in the open.

In gooseberries and red and white currants, of which unopened blossoms were enclosed in muslin and paper bags, but few fruits set, and those apparently only where rubbed by the bags. In those bagged and hand-pollinated, the fruits of gooseberries set fairly well, but as the blossoms open gradually, the flowers should have been pollinated several times. In red currants, bagged and hand-pollinated, the fruits set quite as plentifully as in the open, and some of the berries were notably larger than the average.

The abovementioned fruits are self-fertile, and though all are benefited by the visits of bees, with gooseberries and red and black currants bees are absolutely necessary for the production of fruit.

The fruit trees, namely apples, pears, plums and cherries, may be divided into those varieties that are self-fertile and those that are self-sterile, i.e., those that will set and mature their fruits when pollinated with pollen of the same variety and those that will not.

In pears, no fruits matured on fifteen varieties which were bagged but not pollinated; with those bagged and pollinated with their own pollen, Durondeau, Beurre Diel, General Todleben, Dr. Jules Guyot, Josephine de Malines, and Marie Louise set fruits, but they gradually fell, last of all General Todleben; the only two varieties which matured their fruit were Duchesse d'Angouleme and Colmar d'Ete.

Of pears cross-pollinated, I have good results with Vicar of Winkfield with Winter Crasanne pollen, Williams' Bon Chretien with Duchesse d'Angouleme, Conference with General Todleben and vice versa.

In plums, trials were made with Victoria, Czar, Rivers' Early Prolific, Cox's Emperor, July Greengage, Greengage, Pond's Seedling, Bittern, Jefferson, Dennison's Superb, and Early Orleans; of those bagged and left untouched, only Victoria and Czar set and matured their fruit; of those bagged and pollinated with their own pollen, only Victoria, Czar, Dennison's Superb, Bittern, and Rivers' Early Prolific matured their fruit. These varieties would therefore seem to be self-fertile, but most of them appear to set fruit more plentifully and bear larger fruits when pollinated with pollen of another variety. I ought here to add that Mr. W. O. Backhouse, who has made trials with Rivers' Early Prolific on a large scale, finds it is the exception for this variety to set fruit when fertilised with its own pollen.

Of flowers that were cross-pollinated, I had good plums on Pond's Seedling with Czar pollen, Rivers' Early Prolific with Victoria pollen, Victoria with Czar pollen, Dennison's Superb with Rivers' Early Prolific pollen; the pollinations were made without emasculation.

With cherries, out of some nine different varieties no variety set fruit when bagged and left untouched; when bagged and pollinated with their own pollen, only one variety, Florence, besides Morello, set fruit, and it only bore one or two fruits; Morello set nearly as well as in the open when pollinated with its own pollen.

In the cross-pollinated cherries, fruit set in each case, showing the necessity of visits of bees and the advisability of mixing different varieties of cherries in a plantation.

Out of 63 varieties of apples tried, on which unopened blossoms were bagged and left untouched, only Irish peach matured its fruit, and that was very good; of those bagged and pollinated with their own pollen by brush or anthers, the following matured their fruit: Irish Peach, White Transparent, Newton Wonder, Ecklinville Seedling, Summer Golden Pippin, Baumann's Red Winter Reinette, Peasgood's Nonesuch, Christmas Pearmain, King of the Pippins (damaged by sawfly, eventually fell), and, I believe, American Mother and James Grieve, but am not certain of the two latter. Whereas in nearly all the crosses made good fruits have resulted, out of 64 crosses some 48 were successful; among the best may be mentioned: Brabant Bellefleur with Beauty of Bath pollen, Mr. Gladstone with Beauty of Bath, Alfriston with Beauty of Bath, Christmas Pearmain with Cox's Pomona, Mere de Menage with Sandringham and Hormead Pearmain, Allington Pippin with Summer Golden Pippin, Beauty of Bath with Summer Golden Pippin, High Cannons with Grenadier, The Queen with Baumann's Red Winter Reinette, Lane's Prince Albert with The Queen, Cellini with Graham's Royal Jubilee. These crosses were made without taking out the stamens from the flowers, pollination being effected by brush or anthers; if the brush was used, it was dipped in methylated spirits and allowed to dry before using again; but in the case of a tree of Cox's Orange Pippin, nine bunches of unopened blossoms had their stamens taken out with forceps and were pollinated by camel's hair brush or anthers with the pollen of nine different varieties of apple, to try to see which would give the best result; eight of these set fruit, namely, with High Cannons, Bramley's Seedling, Grenadier, Lady Henniker, Golden Spire, Duchess's Favorite, The Queen, and with its own pollen. In these trials only with Peasgood's Nonesuch did fruit not set. However, they have gradually fallen till the only ones left are those pollinated with High Cannons and Bramley's Seedling, the latter being one of the best fruits on the tree. It would be of interest and probably of value to find out a good polliniser to plant among Cox's Orange Pippin, which is a self-sterile variety, i.e., flowers self-pollinated will not mature fruit. One grower informed me that he found Worcester Pearmain a good variety to plant among Cox's Orange Pippin, and Mr. C. Martin, manager of the Toddington Orchard Co., in Gloucestershire, told me his best fruits of Cox's Orange Pippin came from a plantation interplanted with Duchess's Favorite.

We want more light on this subject in England. Messrs. F. J. Chittenden, W. O. Backhouse, Little and Avery have added valuable information, but we still need much investigation and observation of fruit-growers and economic botanists before we reach the knowledge already gained by American and Australian horticulturists as to which varieties to plant together.—*Cecil H. Hooper.*

◆

Little Lillie came to her mistress. "Ah would like a week's vacation, Miss Annie," she said, in her soft negro accent; "Ah wants to be married."

Lillie had been a good girl, so her mistress gave her the week's vacation, a white dress, a veil and a plum cake.

Promptly at the end of the week Lillie returned radiant. "Oh, Miss Annie!" she exclaimed, "Ah was the mos' lovely bride! Ma dress was perfec', ma veil mos' lovely, the cake mos' good. An' oh, the dancin' an' the eatin'!"

"Well, Lillie, this sounds delightful," said her mistress, "but you have left out the point of your story—I hope you have a good husband."

Lillie's tone changed to indignation. "Now, Miss Annie, what yo' think? Tha' darn nigger nebber turn up!"

THE FORTUNATE ISLES

You sail and you seek for the Fortunate Isles,
The old Greek Isles of the yellowbird's song?
Then steer straight on through the watery miles,
Straight on, straight on, and you can't go wrong,
Nay, not to the left; nay, not to the right,
But on, straight on, and the Isles are in sight—
The Fortunate Isles where the yellow-birds sing,
And life lies girt with a golden ring.

These Fortunate Isles they are not so far,
They lie within reach of the lowliest door;
You can see them gleam by the twilight star;
You can hear them sing by the moon's white shore—
Nay, never look back! Those levelled gravestones
They were landing steps; they were steps unto thrones
Of glory for souls that have sailed before,
And have set white feet on the fortunate shore.

And what are the names of the Fortunate Isles?
Why, Duty and Love and a large Content.
Lo! these are the Isles of the watery miles
That God let down from the firmament;
Lo! Duty and Love, and a true man's Trust;
Your forehead to God, though your feet in dust;
Lo! Duty and Love, and a sweet face's smiles:
And these, O friend, are the Fortunate Isles.

—*Joaquin Miller.*

OF THE NATATORES FAMILY

One spring evening an amateur nature student, notebook in hand, penetrated the wilds of a cow pasture and paused to take advantage of the practical, although crude, knowledge of a greybeard countryman who sat contentedly on a log. "There is a strange bird-note this evening," she began, with sweet condescension. "I wonder—perhaps you can tell me what bird it is?"

The old man removed his pipe for an instant.

"I heerd a robin, mum," he admitted, puffing away at his pipe before the last word was out of his mouth.

"Oh, no!" The student of ornithology shook her head, prettily impatient. "It is a new call, different from anything I have yet come across. Can't you hear it—now?"

Once more the old man perfunctorily removed his pipe, and both he and his questioner strained to listen. There was a bewilderment of woodland and farmyard sounds.

"There," whispered the girl, "that full, shrill note! Can't you hear it? In *that* direction?"

A light broke over the old man's face, and the pucker of intense effort vanished from his forehead.

"Oh, that noise?" He threw back his head with a chuckle of relief. "That's a frog, mum."

COLOR-BLIND

A form of defective vision which will impair the usefulness of anybody, no matter what his employment, is touched upon in this pithy conversation:

Inquisitive Passenger: "What has become of Stokes, who used to be a conductor on this line?"

Conductor: "Why, the company laid him off some time ago."

Inquisitive Passenger: "Laid him off? What for?"

Conductor: "It was found upon investigation that he was color-blind."

Inquisitive Passenger: "Color-blind? What difference did that make in a conductor?"

Conductor: "A good deal. He couldn't tell the difference between the color of his money and the company's."

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